



## Systematic study of the genus *Rossimylops* Mesnil (Diptera: Tachinidae)

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### Abstract

The systematic position and generic limits of *Rossimylops* Mesnil, 1953 (type species: *R. whiteheadi* Mesnil, 1953) are critically redefined. Examination of the male terminalia allowed us to demonstrate the unjustified placement of *Rossimylops* within the subfamily Dexiinae, tribe Dufouriini and its probable affiliation with the subfamily Tachininae, tribe Minthoini. The following generic names are synonymised with *Rossimylops* Mesnil, 1953: *Mesnilomyia* Kugler, 1972 (type species: *M. magnifica* Kugler, 1972) **syn. nov.**, and *Persedea* Richter, 2001 (type species: *P. exquisita* Richter, 2001) **syn. nov.** The following new combinations are proposed: *Rossimylops achilleae* (Kugler, 1972) **comb. nov.**, *R. exquisitus* (Richter, 2001) **comb. nov.**, *R. longicornis* (Kugler, 1972) **comb. nov.**, *R. magnificus* (Kugler, 1972) **comb. nov.**, and *R. subapertus* (Herting, 1983) **comb. nov.** *Mesnilomyia rufipes* Zeegers, 2007 is established as a synonym of *Persedea exquisita* Richter, 2001, **syn. nov.** *Rossimylops austrinus* Cerretti **sp. nov.** from Namibia and *Rossimylops djerbaensis* Cerretti **sp. nov.** from Tunisia are described, illustrated and compared with the other known species of the genus. Male terminalia and female external morphology of *R. subapertus* and *R. whiteheadi* are described for the first time. Finally, *Mesnilomyia calypratra* Zeegers, 2007 is removed from this genus and placed as Tachinidae *incertae sedis*.

**Key words:** Tachininae, Minthoini, *Rossimylops*, *Mesnilomyia*, *Persedea*, Embioptera, systematics, biogeography, new species, new synonymies, types

### Introduction

The genus *Rossimylops* Mesnil was described for the single species *R. whiteheadi* Mesnil, on the basis of a male specimen eclosed from a webspinner (Embioptera) in Grahamstown (South Africa) (Mesnil 1953).

In describing *Rossimylops*, Mesnil (1953), stated that: "In chaetotaxy as well as wing venation, this genus belongs to the European group comprising *Campogaster* Rondani [= *Microsoma* Macquart], *Rondania* Robin-eau-Desvoidy, *Strongygaster* Macquart ...". Based on the morphology of the male terminalia (cf. Tschorsnig 1985) and female terminalia (Herting 1957), the first two genera are today ascribed to the subfamily Dexiinae, tribe Dufouriini (cf. Herting & Dely-Draskovits 1993; O'Hara & Wood 2004), while the third belongs to subfamily Tachininae, tribe Strongygastrini (following O'Hara & Wood 2004). Verbeke (1962) noted that *Rossimylops* could be better ascribed to the "Macquartiines" [= Tachininae, in part]; however, he did not deal with this issue in detail and no attempt has been made to verify whether or not he examined the male terminalia. Crosskey (1980, 1984), substantially following the opinion of Mesnil, ascribed *Rossimylops* to the Dufouriini, without considering characters of the male terminalia. The subfamily Dexiinae, to which the Dufouriini (*sensu* Herting 1984) clearly belong (cf. Tschorsnig 1985), is defined and well corroborated by at least two

apomorphies in the male terminalia (Tschorsnig 1985) [shape of pregonite and flexible junction between basi- and distiphallus]; thus, a genus should not be assigned to this subfamily without checking these apomorphies. Examination of the male terminalia allowed us to demonstrate the unjustified placement of *Rossimylops* within the Dufouriini and its probable affiliation with the Minthoini; at the same time, the finding of two new species from Tunisia and Namibia allowed us to critically redefine the generic limits of *Rossimylops* to include *Mesnilomyia* Kugler and *Persedea* Richter. *Mesnilomyia calyptrata* Zeegers, 2007 is moved from *Mesnilomyia* to Tachinidae *incertae sedis*.

## Material and methods

Terminology of the external morphology follows Merz and Haenni (2000), except for the antenna (see Stuckenberg 1999). Measurements and ratios of the head follow Tschorsnig and Richter (1998).

Label data of holotypes are cited as printed; a single forward slash denotes the end of a line, and a double forward slash denotes the end of a label.

Acronyms of the collections cited in the text (responsible curators in brackets):

|      |   |
|------|---|
| BMNH | The Natural History Museum [formerly British Museum (Natural History)], London, United Kingdom (N. Wyatt) |
| NMNW | Namibian National Insect Collection, Windhoek, Namibia (E. Marais)  |
| NMSA | Natal Museum, Pietermaritzburg, Kwa-Zulu Natal, South Africa (M. Mostovski)                               |
| PCV  | P. Cerretti collection, Verona, Italy   |
| SMNS | Staatliches Museum für Naturkunde, Stuttgart, Germany (H.-P. Tschorsnig)                                  |
| TAU  | Department of Zoology, Tel Aviv University, Tel Aviv, Israel (A. Freidberg)                               |
| TZC  | Theo Zeegers collection, Soest, The Netherlands   |
| ZMAN | Zoölogisch Museum, Amsterdam, The Netherlands (B. Brugge)   |

## Taxonomy

### *Rossimylops* Mesnil

*Rossimylops* Mesnil, 1953: 145. Type species: *Rossimylops whiteheadi* Mesnil, 1953 (by monotypy). References: Verbeke 1962: 117 [notes on systematic position]; Crosskey 1980: 830 [Afrotropical catalogue]; Crosskey 1984: 238 [key to Afrotropical tachinid tribes and genera].

*Mesnilomyia* Kugler, 1972: 103. Type species: *Mesnilomyia magnifica* Kugler, 1972 (by original designation). **Syn. nov.** References: Kugler 1978: 86 [systematic position of *Plesina* Meigen and *Mesnilomyia*]; Tschorsnig and Richter 1998: 760, 772 [key to Palaearctic genera of Tachinidae]; Zeegers 2007: 409 [keys for the identification of specimens of Afrotropical *Mesnilomyia*: modified from Crosskey 1984: 237 (Imitomyiini and Dufouriini)].

*Persedea* Richter, 2001: 25. Type species: *Persedea exquisita* Richter, 2001 (by original designation). **Syn. nov.**

**Diagnosis.** Small flies 2–6 mm in length. Male vertex extremely narrow, and frontal vitta, near vertex, concealed by medial margin of fronto-orbital plate (Fig. 4); female vertex larger with 2 or more proclinate orbital setae. Occiput with black setulae only. Anterior and posterior lappets of metathoracic spiracle about equal in size (Fig. 24). Postmetacoxal area membranous. Mid-dorsal depression on abdominal syntergite 1+2 not extended posteriorly to distal margin of that segment. Marginal setae on tergites 3–5 “shifted” anteriorly into sub-discal position. Dorsolateral lobes of distiphallus well developed and “shifted” anteriorly. Surstylus distally bent posteriorly. Parasitoids of Embioptera.

**Redescription.** Body length: 2–6 mm. *Head* (Figs. 2–5, 8, 11–15, 17, 20, 23, 28, 29, 36–38, 42): Compound eye bare. Vertex at its narrowest point about 0.1 (male), 0.50–1.15 (female) times as wide as compound eye in dorsal view. Lateral vertical seta usually not differentiated from postocular row (well developed only in *R. whiteheadi* female). Ocellar seta from well developed to very short and hair-like. Frontal setae reaching anteroventrally at most to middle of pedicel. Male frontal vitta, near vertex, concealed by medial margin of fronto-orbital plate (Fig. 4). Dorsal orbital setae usually not differentiated in male, 1 or 2 in female. Male without, female with 2–4 proclinate orbital setae. Parafacial bare. Parafacial at its narrowest point 0.50–1.25 times as wide as postpedicel. Facial ridge slightly concave or straight. Facial ridge with slender and decumbent setae on ventral 0.2–0.4. Face more or less visible in lateral view. Ventral facial margin from not visible to well visible in lateral view anterior to vibrissal angle. Postpedicel 1.5–3.5 times as long as pedicel. Arista bare, thickened on basal 0.2–0.4. First and second aristomeres short. Gena in profile not more than 0.4 times as high as compound eye (height measured in the same vertical plane as height of head). Genal dilation well developed. Occiput with black setulae only. Prementum 2–10 times as long as diameter at mid length. Labella not elongated, posterior extensions developed only in female of *R. longicornis* and *R. whiteheadi*. Palpus subcylindrical or slightly clavate. *Thorax* (Figs. 8, 18, 21, 22, 24, 38, 39): black to yellow in ground colour. Scutum with or without reflecting microtrichia, if present, presutural area with three longitudinal dark vittae. Prosternum and proepisternum bare. Postpronotum with 2 or 3 setae arranged in a more or less straight line. Scutum with 2–3 presutural dorsocentral setae, 3–4 postsutural dorsocentral setae, 2–3 postsutural intra-alar setae. Katepisternum with 1–2 setae. Katepimeron bare. One short anepimeral seta. Scutellum varied from black to yellow, with 2–3 pairs of marginal setae; when three, the lateral seta displaced very close and ventrally to basal seta (Figs. 18, 21, 22, 39). Apical scutellar setae crossed and horizontal. Anatergite bare or with small patch of short, black, erect setulae. Anterior and posterior lappets of metathoracic spiracle about equal in size (Fig. 24). Postmetacoxal area membranous. *Wing* (Figs. 6, 7, 16, 19, 25, 26, 30, 40): membrane varied from hyaline to strongly pigmented. Ventral calypter usually divergent from the scutellum (Figs. 18, 21). Costal spine not differentiated, usually shorter than costal setulae. Second costal portion (CS<sub>2</sub>) ventrally bare. R<sub>1</sub> bare. Base of R<sub>4+5</sub> dorsally bare or with few setulae basally. CuA<sub>1</sub> bare. Bend of M with or without a stub or continuation. Cell r<sub>4+5</sub> varied from just closed at wing margin to long petiolate. *Legs*: Medial anterior surface of fore coxa bare or predominantly so. Preapical anterodorsal seta on fore tibia at most as long as preapical dorsal seta. Mid tibia with 1–3 anterodorsal setae. Hind tibia with 2 or 3 dorsal preapical setae. Preapical posteroventral seta on hind tibia nearly as long as preapical anteroventral seta. Anterodorsal setae on hind tibia irregular in length. Posterior margin of hind coxa bare. *Abdomen* (Figs. 31, 41, 43): varied from black to yellow in ground colour, with or without microtrichia. Mid-dorsal depression on abdominal syntergite 1+2 confined to anterior 0.50–0.75 of segment. Marginal setae on tergites 3–5 “shifted” anteriorly into sub-discal position. Tergites 3 and 4 without median discal setae. *Male terminalia* (Figs. 9, 10, 27, 32–35, 44–47): Tergite 6 narrow, fused with segment 7+8. Epandrium short and convex. Hypandrial arms not joined, sub-parallel. Pregonite pointed distally and strongly bent anteriorly, posterior margin with setae. Postgonite varied from straight to sinuous, with or without setae. Basiphallus without basal keel. Epiphallus in para-basal position, well developed, usually weakly sclerotized. Basiphallus joined to distiphallus by dorsal sclerite. Dorsolateral lobes of distiphallus well developed and “shifted” anteriorly. Acrophallus not tubular. Cerci not fused distally. Surstylus distally bent posteriorly.

**Hosts.** Embioptera (so far known only for *R. exquisitus* and *R. whiteheadi*).

**Distribution** (Fig. 1). **Palearctic:** East Mediterranean Europe (Tschorsnig *et al.* 2004), Iran (Herting 1983; Richter 2001), Iraq, Israel, Egypt (Sinai) (Kugler 1972; present work), Transcaucasia (Richter 1995), Turkmenistan (Ziegler 1991), Tunisia (Tschorsnig & Richter 1998; present work); **Afrotropical:** Namibia (present work), South Africa (Mesnil 1953; Crosskey 1980; Crosskey 1984).

**Remarks on *Mesnilomyia*.** The genus *Mesnilomyia* was described by Kugler (1972: 103) to include three new species: *M. magnifica* Kugler, 1972 from Israel and Iraq, *M. achilleae* Kugler, 1972 and *M. longicornis*

Kugler, 1972 from Israel (Fig. 1). Of these, *M. longicornis* has since been recorded from Greece (including Crete and the North Aegean Islands), Bulgaria (cf. Herting 1984; Tschorsnig *et al.* 2004) and Transcaucasia (Richter 1995) (Fig. 1). Later Herting (1983: 5) described a fourth species, *M. subaperta*, based on a single male specimen collected in southeastern Iran (Anbar-Abad), which considerably differs morphologically from males of the previously described species (see below). *Mesnilomyia subaperta* was later recorded also from Turkmenistan by Ziegler (1991), this being the only other known record for the species. Recently Zeegers (2007) described *M. calyptrata* Zeegers, 2007 and *M. rufipes* Zeegers, 2007 from Yemen. The systematic position of *Mesnilomyia* was originally discussed by Kugler (1972) who concluded, after a brief morphological analysis: “According to Mesnil (personal communication), *Mesnilomyia* is close to the Ptilopsinina, but flies belonging to this subtribe have discal bristles at least on the fifth abdominal segment.” Mesnil (1972), following his communication to Kugler, included *Mesnilomyia* in the Ptilopsinina, together with the only other genus *Ptilopsina* Villeneuve, 1920: 117 [currently = *Anthomyiopsis* Townsend, 1916: 20]. Herting (1984) did not accept Mesnil’s conclusions and included *Mesnilomyia* in the Minthoini. Herting (1984: 191, note 100) emphasised that the presence of posterior extensions of the labella is “characteristic” for Minthoini, although *Mesnilomyia* spp. usually do not share this character state [except for the females of *R. longicornis* and *R. whiteheadi*]. The posterior extensions of the labella are also lacking in many other Minthoini (e.g. *Actinochaeta* Brauer and Bergenstamm, *Actinominthella* Townsend, *Dolichopodomintho* Townsend, *Hyperaea* Robineau-Desvoidy, *Paradidyma* Brauer and Bergenstamm).

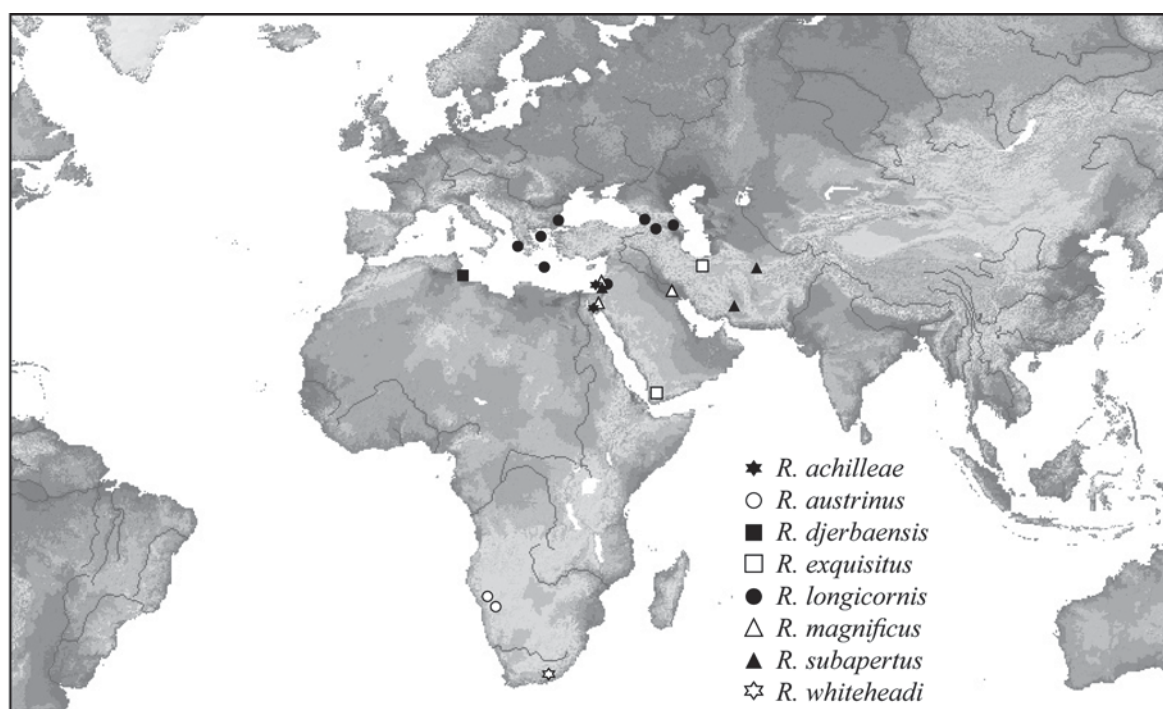


FIGURE 1. Known distribution of *Rossimylops* spp.

A detailed examination of the external morphology of all species and of the male terminalia of most species did not reveal any apomorphies supporting *Mesnilomyia* as a monophyletic group. On the other hand, the morphology of the surstylus and phallus of *Rossimylops whiteheadi* Mesnil indicates that the species so far ascribed to *Mesnilomyia* [except *M. calyptrata*, see below] form a paraphyletic group with respect to *R. whiteheadi*.

**Remarks on *Persedeia*.** The genus *Persedeia* was known only from the type species. Richter (2001: 26), in her diagnosis of the genus, underscored that *Persedeia* can be clearly distinguished from *Mesnilomyia* by: i) sclerotized postmetacoxal area, as in *Plesina* Meigen, ii) small ventral calypter, not deflected as in *Mesnilo-*

*myia*, and iii) sternite 2 not hidden by the margins of the corresponding tergite. Re-examination of the holotype of *Persedeia exquisita* did not reveal any sclerotization of the postmetacoxal area, whereas the shape and orientation of the ventral calypter varied greatly in all other species now assigned to *Rossimylops*; thus, the use of the latter character is not advisable in a generic diagnosis. Similarly, the exposition of the sternites varied greatly according to specimen of *Rossimylops* examined, probably because of the degree of sclerotization of the cuticle and the way in which the specimen had dried out. Characters or combinations of characters unequivocally identifying *Persedeia* could not be found and this genus is therefore synonymised under *Rossimylops*.

### Keys for the identification of specimens of *Rossimylops* in the Afrotropical Region.

The key to genera of tropical and southern African tachinids of Crosskey (1984) should be modified as follows:

#### Key to tribes, pag. 226, couplet 48

48. Epistome [= ventral facial margin] warped forward from the face and its margin clearly visible in front of the vibrissal insertion when the head seen in profile (Figs. 3, 11, 15, 42), but if not clearly visible in front of the vibrissal insertion (Figs. 2, 23, 28, 36), then simultaneously: small flies 2–6 mm in length; male vertex extremely narrow and frontal vitta, near vertex, concealed by medial margin of fronto-orbital plate (Fig. 4); female vertex larger with 2 or more proclinate orbital setae; occiput with black setulae only; two katapisternal setae; anterior and posterior lappets of metathoracic spiracle about equal in size (Fig. 24); postmetacoxal area membranous; scutellum with 2–3 pairs of marginal setae; mid-dorsal depression on abdominal syntergite 1+2 not extended posteriorly to distal margin of that segment; marginal setae on tergites 3–5 “shifted” anteriorly into sub-discal position; dorsolateral lobes of distiphallus well developed and “shifted” anteriorly (Figs. 34, 35, 47). Surstylus distally bent posteriorly (Figs. 9, 27, 32, 44). Parasitoids of Embioptera.....49
- Epistome [= ventral facial margin] not or but slightly warped forward from the face and its margin not protruding so as to be clearly visible in front of the vibrissal insertion when the head seen in profile. Other combination of characters.....52

#### Key to tribes, pag. 226, couplet 50

50. Arista thickened on at least two-third of its length [...].....Leskiini (part)
- Arista thickened at most on its basal third and both basal segments non-elongate and very inconspicuous. Wing cell  $R_5$  [=  $r_{4+5}$ ] open, closed at the wing margin or long petiolate (only in some *Rossimylops*). Other combination of characters.....51
51. Lower calyptrae small and circular, their inner [= medial] margins widely removed from the scutellum. Two *stpl* [= katapisternal] setae. Occiput with black setae and setulae only. Thorax, legs and abdomen usually entirely black in ground colour (except in *R. exquisitus* which is mainly yellow). Scutum with 3 dark vittae before transverse suture or without any vitta. Body length: 2–5 mm..... *Rossimylops*
- Lower calyptrae widening posteriorly, hind margin not uniformly circular and inner [medial] posterior parts not far removed from scutellum. Other combination of characters .....Leskiini (part)

## Existing keys for the identification of specimens of Palearctic *Rossimiops*

Tschorsnig and Richter (1998: 660, 672); this key does not require any modifications. However, it must be pointed out that in the present paper there is a substantial difference in the terminology used for the marginal setae of the scutellum. *Rossimiops djerbaensis* **sp. nov.**, *R. exquisitus* and *R. subapertus* have three pairs of marginal scutellar setae; the pair situated between “apical” and “basal” pairs is named “subapical” in Tschorsnig and Richter (1998), whereas we call it “lateral”.

### Identification key to *Rossimiops* species

1. Wing cell  $r_{4+5}$  closed at wing margin, not or very slightly petiolate (Fig. 40). Scutellum with 3 marginal setae (Fig. 39). Vein  $R_{4+5}$  bare or with one basal setula .....2
- Wing cell  $r_{4+5}$  long petiolate (Figs. 6, 7, 16, 19, 25, 26, 30). Scutellum with 2 or 3 marginal setae. Base of  $R_{4+5}$  bare .....3
2. Ventral facial margin not visible in lateral view (Fig. 36). Prementum 2.0–2.3 times as long as its diameter at mid length. Fore tibia with 2 posterior setae. Mid tibia with 1 anterodorsal seta. Lateral presutural longitudinal dark vittae very small, not reaching the transverse suture posteriorly (Fig. 38). Abdomen shiny black, practically without reflecting microtrichia (Fig. 41). Male: cerci and surstylus stout; cerci, in posterior view apically rounded (Fig. 33). Female: lateral vertical seta not differentiated from the postocular row ..... *R. subapertus* (Herting)
- Ventral facial margin well visible in lateral view, anterior to vibrissal angle (Fig. 42). Prementum very elongated, 6–10 times as long as wide. Fore tibia with 1 posterior seta. Mid tibia with 2 anterodorsal setae. Lateral presutural longitudinal dark vittae broad, clearly reaching the transverse suture posteriorly. Abdominal tergites 3–5 with narrow basal bands of reflecting microtrichia (Fig. 43). Male: cerci and surstylus not as above; cerci in posterior view sub-triangular, apically pointed (Fig. 45). Female: lateral vertical seta well developed and differentiated from the postocular row ..... *R. whiteheadi* Mesnil
3. Scutellum with 3 pairs of marginal setae (Figs. 18, 21, 22). Scutum, anterior to transverse suture, practically without microtrichia, and not showing dark longitudinal vittae. Mid tibia with 1–2 anterodorsal setae. Petiole of  $r_{4+5}$  about 0.7–1.0 times as long as post-angular portion of M. Only females known .....4
- Scutellum with 2 pairs of marginal setae. Scutum with 3 dark longitudinal vittae anterior to transverse suture (Fig. 8). Mid tibia with 1 anterodorsal seta. Petiole of  $r_{4+5}$  about 0.3–1.0 times as long as post-angular portion of M. ....5
4. Parafacial at its narrowest point very narrow, about 2 times as wide as maximum diameter of arista (Fig. 20-a). Thorax (including scutellum), coxae, femora, and palpus yellow. Abdominal syntergite 1+2 and tergite 3 yellow at least anteroventrally; tergites 4 and 5 usually black (at least dorsally). Wing membrane hyaline. Ventral seta of mid tibia longer than maximum diameter of mid tibia ..... *R. exquisitus* (Richter)
- Parafacial at its narrowest point about 3–4 times as wide as maximum diameter of arista (Fig. 17-a). Thorax (including scutellum) and femora black, coxae varied from black to reddish, palpus basally yellow-brown shading into black distally. Abdomen entirely black. Wing membrane slightly smoky anteromedially and around veins (Fig. 19). Ventral seta of mid tibia weak and shorter than maximum diameter of mid tibia ..... *R. djerbaensis* **sp. nov.**
5. Vertex very narrow, no more than 0.13 of compound eye in dorsal view (usually less); no proclinate orbital setae; frontal vitta very narrow, practically indistinct anterior to fore ocellus (Fig. 4) ..... [males] 6 [male of *R. austrinus* sp. nov. unknown]
- Vertex at least half as wide as compound eye in dorsal view (usually more), with 2 or more proclinate orbital setae, frontal vitta not as above (Figs. 3, 5, 12, 13, 20, 28, 29) ..... [females] 8

6. Face flat, ventral facial margin not visible in lateral view (Fig. 23). Prementum about 2–3 times as long as its diameter. Postpedicel 2.46–2.90 times as long as pedicel. Wing membrane entirely hyaline (Fig. 25). Section of M between r-m and dm-cu usually distinctly shorter than section between dm-cu and bend of M (Figs. 25, 26). Petiole of  $r_{4+5}$  more than half (and up to as long) as post-angular portion of M.....  
..... *R. longicornis* (Kugler)
- Ventral facial margin well visible in lateral view, anterior to vibrissal angle (Fig. 2). Prementum about 4–5 times as long as its diameter. Postpedicel 1.74–2.20 times as long as pedicel. Wing membrane hyaline or brownish anteriorly. Section of M between r-m and dm-cu about as long as section between dm-cu and bend of M (Figs. 6). Petiole of  $r_{4+5}$  0.3–0.5 (rarely more) times as long as post-angular portion of M..... 7
7. Wing anteriorly brownish (Fig. 6). Postpedicel 1.93–2.20 times as long as pedicel. Body length: 2.5–3.5 mm.....*R. achilleae* (Kugler)
- Wing membrane entirely hyaline (Fig. 30). Postpedicel 1.74–1.88 times as long as pedicel. Body length: 4.5–6.0 mm.....*R. magnificus* (Kugler)
8. Face flat, ventral facial margin not visible in lateral view. Postpedicel 2.7–3.1 times as long as pedicel. Prementum about 2–3 times as long as its diameter. Wing pattern as in Fig. 26. Ventral calypter varied from brownish with a slightly darker rim to evenly dark brown. Halter yellow to light brown.....  
..... *R. longicornis* (Kugler)
- Ventral facial margin visible in lateral view, anterior to vibrissal angle (Figs. 3, 11, 15, 28). Postpedicel about 1.7–2.5 times as long as pedicel. Prementum about 4–5 times as long as its diameter. Wing not as above (Figs. 7, 16). Calypteres white to yellowish. Halter yellow to black.....9
9. Vertex about 0.5 times as wide as compound eye in dorsal view (Fig. 13). Parafacial, in lateral view (Fig. 14-b), about 0.5–0.6 as wide as postpedicel (Fig. 14-a). Fronto-orbital plate with dark stripe on its medial margin, between the row of proclinate orbital setae and setulae and the frontal vitta (Fig. 12). Ventral facial margin well visible in lateral view, anterior to vibrissal angle (Fig. 15-a), protruding by about the distal width of antennal pedicel (Fig. 15-b). Halter black. Wing membrane slightly infusate anteriorly (Fig. 16). Coxae black. Abdomen shiny black, without microtrichia. Postpedicel 2.0–2.5 times as long as pedicel (Fig. 14)..... *R. austrinus* sp. nov.
- Vertex at least 0.68 times as wide as compound eye in dorsal view. Parafacial, in lateral view, 0.75–1.00 times as wide as postpedicel (Figs. 3, 28). Fronto-orbital plate entirely and evenly covered with microtrichia (Figs. 5, 29). Ventral facial margin not so strongly protruding (Figs. 3, 28). Halter yellow to dark brown. Wing pattern as in Fig. 7. Coxae light brown, red to yellowish. Abdomen shiny black to entirely covered with microtrichia. Postpedicel 1.68–2.47 times as long as pedicel.....10
10. Postpedicel 1.72–2.47 times as long as pedicel. Body length: 2.5–3.5 mm.....*R. achilleae* (Kugler)
- Postpedicel 1.68–1.88 times as long as pedicel. Body length: 4.5–6.0 mm.....*R. magnificus* (Kugler)

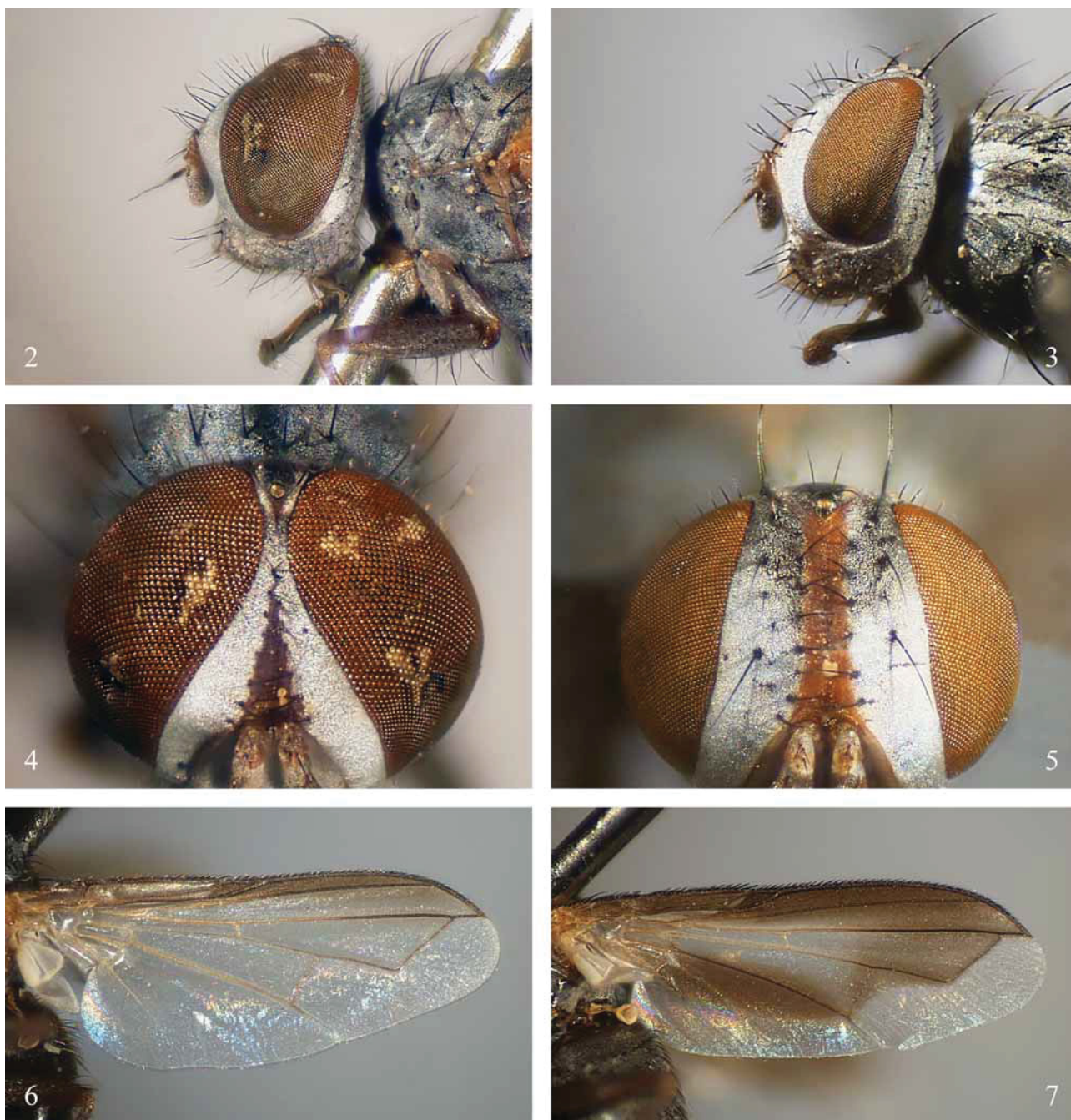
***Rossimylops achilleae* (Kugler) comb. nov.**

(Figs. 2–10)

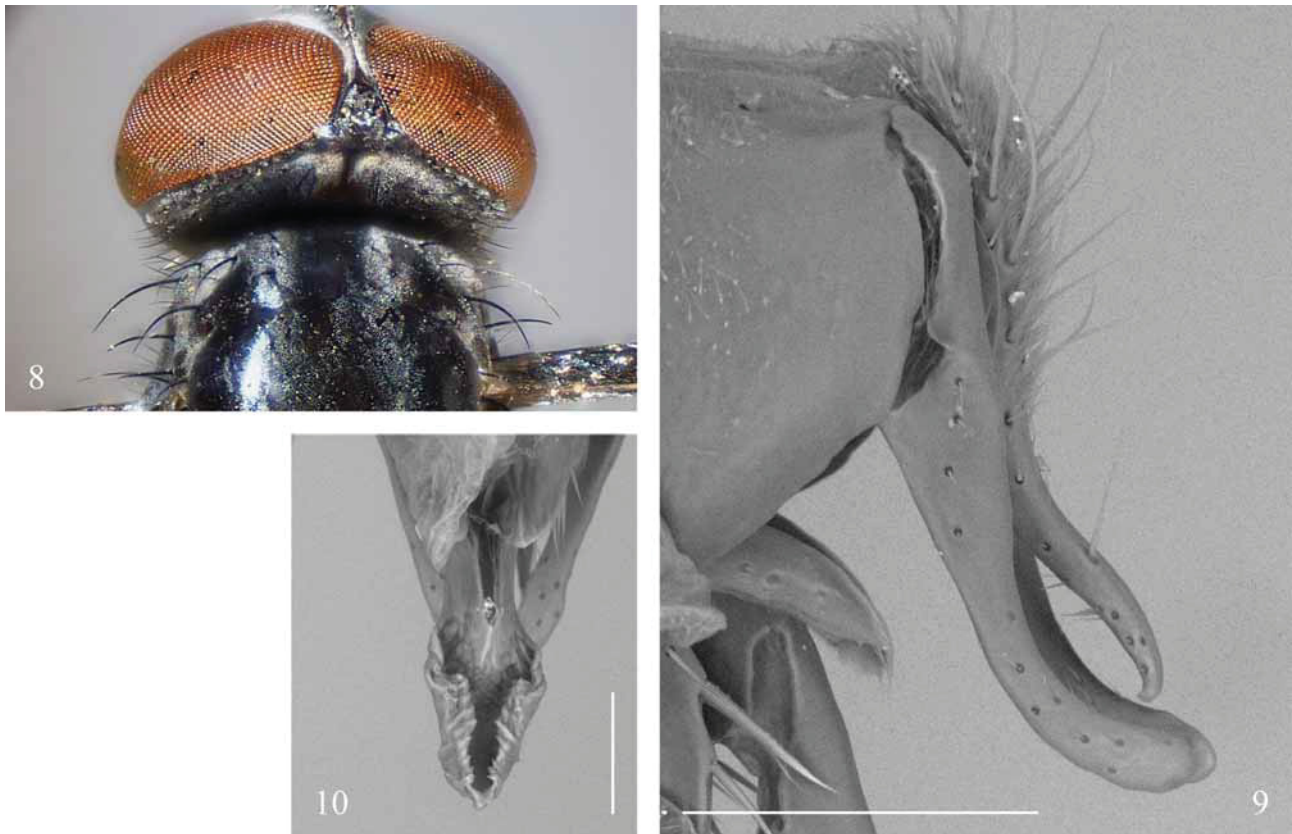
*Mesnilomyia achilleae* Kugler, 1972: 107. Type locality: 'Arad (Israel).

**Type material examined. Holotype** ♂: 'Arad / Israel / 30.VI.1970 / leg. Kugler // *Mesnilomyia* # [sic!] / *achilleae* Kugler // HOLOTYPE [TAU]. Allotype: same data as holotype [TAU]. **Paratypes:** ISRAEL – 1 ♂, 1 km South west to Jerusalem, 11.iv.1962, Avigdor; 3 ♂♂ 2 ♀♀, 'Enot Qane [Treibe], 19.vii.1971, J. Kugler; 2 ♂♂ 1 ♀, Be'er Sheva', 4.viii.1970, J. Kugler; 'Arad: 1 ♂, 12.v.1970; 27 ♂♂, 6 ♀♀, 30.vi.1970 [1 female dissected to examine genital apparatus, eggs and larvae]; 1 ♂ 4 ♀♀, 6.vii.1970; 2 ♂♂, 15.viii.1970; 2 ♀♀, 6.v.1971; 8 ♂♂ 3 ♀♀, 1.vii.1971; 1 ♂, 1 ♀, 19.vii.1971, all J. Kugler. 1 ♂ 1 ♀, Shivta, 4.vi.1970, J. Kugler [all TAU].

**Other material examined.** ISRAEL – 2 ♀♀, Rosh Ha'Ayin, 11.v.1982, Nussbaum [this is the only non-desert record for this species, and we think it needs confirmation]; 3 ♂♂, 3 ♀♀, Nahal Ye'elim, 3km E 'Arad, 30.iv.1987, A. Freidberg; Nahal Sekher: 7 ♂♂ 1 ♀, 19.vii.1984, 1 ♂, 9.vii.2001, F. Kaplan, A. Freidberg; 1 ♂, 'Avedat, 19.iv.1975, A. Freidberg; 1 ♂, 'En 'Avedat, 29.iv.1984, A. Freidberg; 15 ♂♂ 2 ♀♀, 'En 'Aqev, 8.viii.1977, A. Freidberg; 1 ♂, 'En Ziq, 8.viii.1977, A. Freidberg; 1 ♂, Nizzanim, 10km W, 10.vi.1997, A. Freidberg (on *Haplophyllum* sp. (Rutaceae)); 1 ♂, Ramon, 950m, 8.v.2003, A. Freidberg; 18 ♂♂ 1 ♀, Ha'Meshar, 9.viii.1977, A. Freidberg; 1 ♂ 1 ♀, Paran, 11.iv.1992, A. Freidberg. EGYPT [labelled: Israel] – 1 ♂, Sinai Mts. Wadi Shag, 17.vii.1974, A. Freidberg; 1 ♀, Sinai Mts. El-Arbain, 14.vii.1974, F. Kaplan; 6 ♂♂, Mitle, 8.ix.1977, D. Simon; 1 ♀, Sinai Mts. St. Katharina, 18.vii.74, A. Freidberg [all TAU].



**FIGURES 2–7.** *Rossimylops achilleae* (Kugler). **2.** Head in lateral view (holotype male). **3.** Head in lateral view (paratype female: Israel, 'Arad). **4.** Head in anterodorsal view (holotype male). **5.** Head in anterodorsal view (paratype female: Israel, 'Arad). **6.** Left wing in ventral view (holotype male). **7.** Left wing in ventral view (paratype female: Israel, 'Arad).



**FIGURES 8–10.** *Rossimylops achilleae* (Kugler). **8.** Head and scutum in dorsal view (male: Israel, Har Ramon). **9.** Cerci and surstylus in left lateral view (male: Israel, Ha'Meishar), scale bar: 0.1 mm. **10.** distiphallus in ventral view (male: Israel, Ha'Meishar), scale bar: 50  $\mu$ m.

**Diagnosis.** Body length: 2.5–3.5 mm. Ventral facial margin well visible in lateral view, anterior to vibrissal angle (Figs. 2, 3). Prementum about 4–5 times as long as its diameter (Figs. 2, 3). Presutural area of scutum (as well as postsutural area) with three wide longitudinal dark vittae (lateral pair about as wide as medial vitta, reaching the transverse suture posteriorly) (Fig. 8). Scutellum with 2 pairs of marginal setae. Halter yellow to dark brown. Petiole of  $r_{4+5}$  0.3–0.5 (rarely more) as long as post-angular portion of M (Figs. 6, 7). Base of  $R_{4+5}$  bare. Abdomen from shiny black to entirely covered with microtrichia. Male: vertex less than 0.13 times as wide as compound eye in dorsal view; wing anteriorly brownish (Fig. 6); postpedicel 1.74–2.20 times as long as pedicel; surstylus long and narrow, distally bent posteriorly in lateral view (Fig 9); cerci, in lateral view, sinuous and apically hook-like (Fig. 9); dorsal lobes of distiphallus displaced anteriorly as in Fig. 10. Female: vertex, at it narrowest point, at least 0.68 times as wide as compound eye in dorsal view; postpedicel 1.72–2.47 times as long as pedicel; parafacial, in lateral view, 0.75–1.00 times as wide as postpedicel; fronto-orbital plate entirely and evenly covered with whitish-grey reflecting microtrichia (Fig. 5); wing pattern as in Fig. 7; coxae varied from light brown, to red to yellowish.

**Description.** See original description (Kugler 1972).

**Hosts.** Unknown.

**Distribution.** Egypt (Sinai), Israel (Fig. 1).

***Rossimylops austrinus* Cerretti sp. nov.**  
(Figs. 11–16)

**Type material examined.** **Holotype** ♀: Namibia: KARIBIB DISTRICT / Tsaobismund 85 at: [sic!] / 22°22'40"S 15°44'58"E / 13-15.iv.2001 / A.H. Kirk-Spriggs & E. Marais / Malaise traps [NMNW]. **Paratype** ♀: Namibia: Brandberg, Sonusib Ravine, 1435m, 21°04.546'S 14°36.958'E, 02.xii.2000, E. Marais & W. Mey, Malaise trap [NMNW] [specimen dissected to examine genital apparatus, eggs and larvae].

**Etymology.** From the Latin *austrinus* (meaning southern) and should be treated as a Latin adjective.

**Diagnosis.** Female. Ventral facial margin well visible in lateral view anterior to vibrissal angle (Figs. 11, 15-a). Vertex about half as wide as compound eye in dorsal view (Fig. 13). Fronto-orbital plate with dark vitta on medial margin, between row of proclinate orbital setae and setulae, and frontal vitta (Fig. 12). Gena in profile about 0.3 times as high as compound eye. Postpedicel 2.0–2.5 times as long as pedicel. Parafacial at its narrowest point 0.7–0.8 times as wide as postpedicel. Tegula red or yellow. Basicosta yellow. Vein  $R_{4+5}$  entirely bare. Cell  $r_{4+5}$  with a long petiole, 0.38–0.53 times as long as post-angular portion of M (Fig. 16). Calypteres white. Halter blackish-brown. Mid tibia with 1 anterodorsal seta. Abdomen shiny black. Male: unknown.

**Description.** Female. Body length: 2.85 (holotype) – 4.10 mm.

Colour. Head black, covered with dense grey microtrichia; fronto-orbital plate with dark vitta on medial margin, between row of proclinate orbital setae and setulae, and frontal vitta (Fig. 12). Frontal vitta reddish-brown. Scape and pedicel varied from yellowish-red to brown. Postpedicel mainly black, more or less yellow basally; palpus yellow, at most basally brown. Thorax and legs entirely black; scutum with grey reflecting microtrichia, presutural area with three longitudinal dark vittae. Ventral and dorsal calypteres white. Wing slightly smoky anteromedially with milky posterior rim. Tegula and basicosta red or yellow. Halter black. Abdomen shiny black without microtrichia.

Head (Figs. 11–15). Arista thickened on basal third. First and second aristomeres as long as wide. Postpedicel about 2.0–2.5 times as long as pedicel. Vertex at its narrowest point 0.51–0.52 times as wide as compound eye in dorsal view. Ocellar seta well developed, proclinate. Ocelli in form of isosceles triangle (distance of posterior ocelli from one another is smaller than distance between posterior and anterior ocelli). Medial vertical seta strong, reclinate, sub-parallel. One dorsal orbital seta; 1–3 proclinate orbital setae and several proclinate setulae in line. Six to 9 frontal setae descending anteroventrally to level of base of scape or slightly more ventrally. Parafacial in lateral view at its narrowest point about 0.5–0.6 times as wide as postpedicel. Face not visible in lateral view. Ventral facial margin well visible in lateral view, anterior to vibrissal angle. Vibrissa more or less developed, arising above level of ventral facial margin. Facial ridge with decumbent setulae on ventral 0.25–0.33. Gena in profile about 0.33 times as high as compound eye. Postocular setae short. Occiput flat or slightly convex, without white hair-like setulae. Prementum about 4–5 times as long as wide. Palpus 0.8–0.9 times as long as postpedicel.

Thorax. Postpronotum with 2 setae. Scutum with 2 + 2–3 acrostichal, 2–3 + 3–4 dorsocentral, 0–1 + 2–3 intra-alar, 1 posthumeral, 1 presutural, 2 notopleural and 2 postsutural supra-alar setae; postalar callus with 2 setae. Anatergite bare (holotype) or with a small patch of short, black, erect setulae. Katepisternum with 2 setae. One short anepimeral seta, about 0.5–0.7 times as long as katepisternal setae. Scutellum with 2 pairs of marginal setae (basal and apical) of about equal length; apical pair crossed and horizontal.

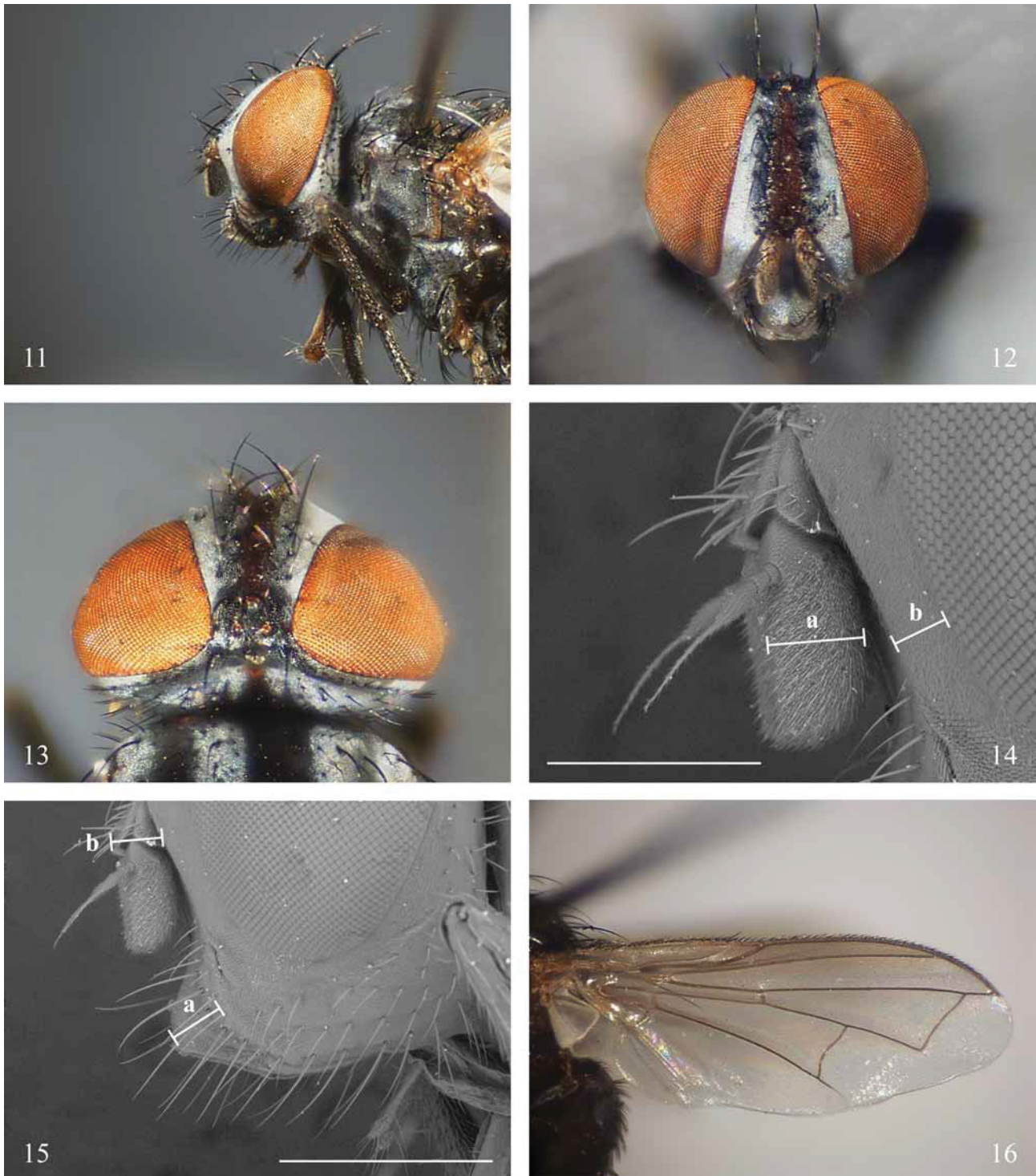
Legs. Fore tibia without posterior setae; preapical anterodorsal seta of fore tibia slightly shorter than preapical dorsal seta; fore claws shorter than tarsomere 5. Mid tibia with 1 anterodorsal seta, 1 posterior seta, 1 ventral seta. Posterior margin of hind coxa bare; hind tibia with an irregular row of 4–6 anterodorsal setae.

Cell (Fig. 16). Base of  $R_{4+5}$  bare. Bend of M nearly at a right angle or slightly obtuse. Crossvein dm-cu not oblique (nearly at a right angle). Wing cell  $r_{4+5}$  long petiolate, petiole 0.38–0.53 times as long as post-angular portion of M.

Abdomen. Tergites slightly fused medially. Syntergite 1+2 without discal and marginal setae. Tergite 3 with 1 pair of median marginal setae. Tergite 4 with 2 erect median marginal and 2–4 decumbent latero-median and lateral setae. Tergite 5 with a row of 5–6 marginal setae. “Marginal” setae of abdomen displaced anteriorly to discal or sub-discal position.

**Hosts.** Unknown.

**Distribution.** Namibia (Fig. 1).



**FIGURES 11–16.** *Rossimylops austrinus* sp. nov. (holotype female). **11.** Head in left lateral view. **12.** Head in anterodorsal view. **13.** Head in dorsal view. **14.** Detail of antenna and parafacial in left lateral view, scale bar: 0.2 mm; a- width of postpedicel, b- width of parafacial at its narrowest point. **15.** Detail of ventral half of head in left lateral view, scale bar: 0.4 mm; a- protruded ventral facial margin, b- distal width of pedicel. **16.** Left wing in ventral view.

***Rossimylops djerbaensis* Cerretti sp. nov.**

(Figs. 17–19)

**Type material examined.** **Holotype** ♀: TUNESIEN, Jerba / 5 km w Midoun / 22.5.1993 / leg. Miksch [SMNS].

**Etymology.** From the type locality Djerba (also transliterated as Jerba, Jarbah or Girba).

**Diagnosis.** Female. Palpus basally yellowish-brown shading into black distally. Thorax and femora black; coxae varied from black to reddish. Ventral facial margin not protruding and hardly visible in profile. Parafacial at its narrowest point about 0.75 times as wide as postpedicel (about 3–4 times as wide as maximum diameter of arista) (Fig. 17). Scutellum with 3 pairs of marginal setae (Fig. 18). Ventral seta of mid tibia shorter than maximum diameter of mid tibia and very weak. Wing membrane slightly smoky anteromedially and around veins (Fig. 19); cell  $r_{4+5}$  long petiolate (Fig. 19); base of  $R_{4+5}$  bare. Abdomen entirely black. Male unknown.

**Description.** Female. Body length: 3.5 mm.

**Colour.** Head mainly black with yellow gena, covered with light grey reflecting microtrichia; vertex and ocellar triangle shiny black; fronto-orbital plate only slightly microtrichose. Frontal vitta reddish-brown. Scape, pedicel and most of postpedicel yellowish-red; postpedicel blackish-brown only along dorsal and distal surface. Palpus yellowish-brown basally, shading into black distally. Thorax entirely black, very slightly microtrichose on postpronotum, anterolateral portion of scutum, anterior to transverse suture, and pleura. Ventral and dorsal calypteres white. Wing slightly smoky anteromedially and around veins (Fig. 19); portion of membrane posterior to cells  $r_{4+5}$  and dm milky. Tegula and basicosta blackish-brown. Halter blackish-brown. Legs black; fore coxa brown. Abdomen shiny black almost without microtrichia.

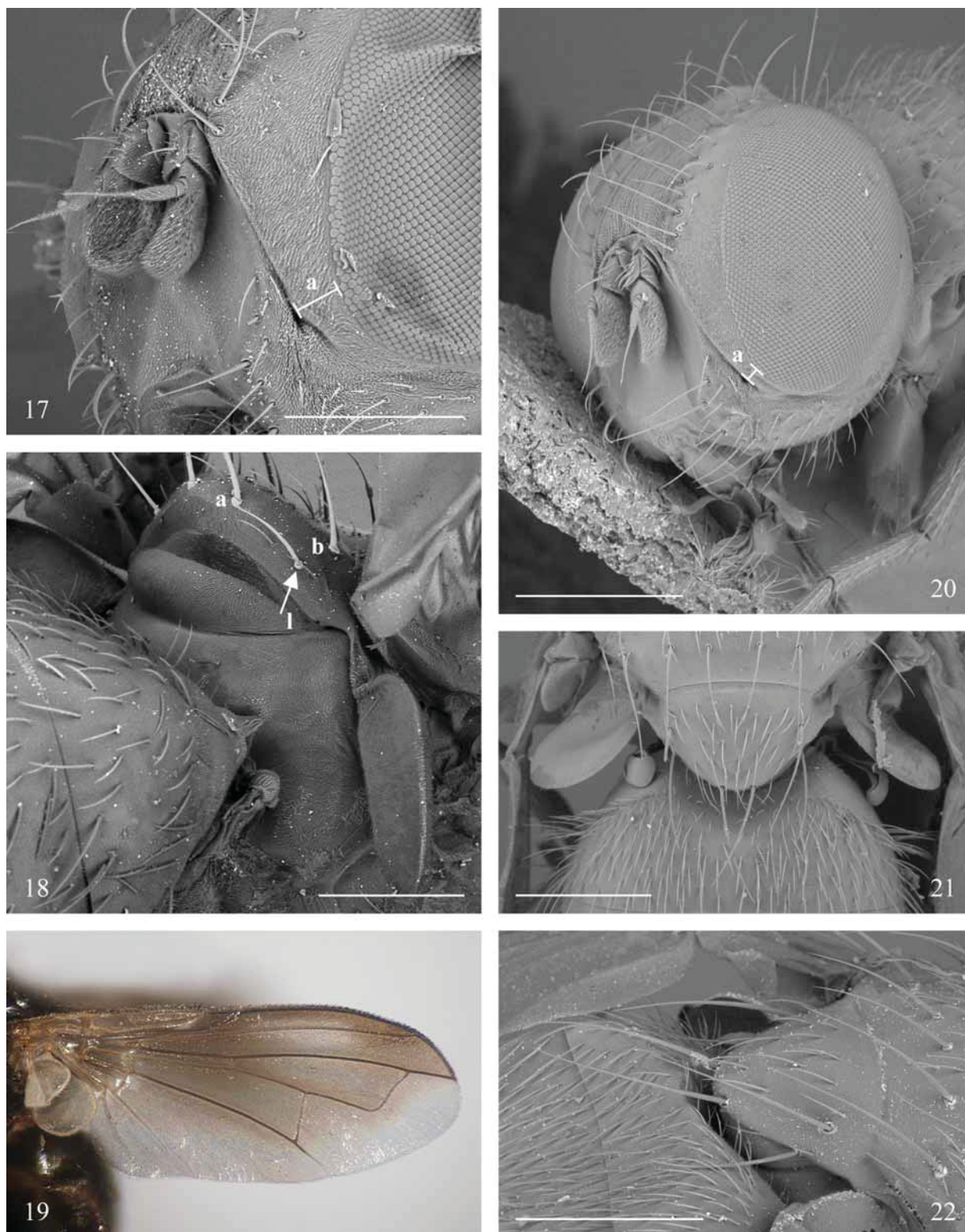
**Head** (Fig. 17). Arista thickened on basal third. First and second aristomeres as long as wide. Postpedicel about 2.7 times as long as pedicel. Vertex at its narrowest point 1.13 times as wide as compound eye in dorsal view. Ocellar seta well developed, proclinate. Ocelli in form of equilateral triangle. Medial vertical seta well developed, reclinate. One or 2 dorsal orbital setae (asymmetric in the holotype). Three proclinate orbital setae. Eight frontal setae descending to level of base of scape or slightly more ventrally. Parafacial at its narrowest point about 0.75 times as wide as postpedicel (about 3–4 times as wide as maximum diameter of arista). Face and ventral facial margin not visible in lateral view. Vibrissa well developed, arising slightly above level of ventral facial margin. Facial ridge with only few decumbent setulae above vibrissa. Gena in profile 0.27 times as high as compound eye. Postocular setae short. Occiput flat, without white hair-like setulae. Prementum about 2.0–2.5 times as long as wide. Palpus slightly clavate with several setulae apically.

**Thorax** (Fig. 18). Postpronotum with 2 setae. Scutum with 2 + 2–3 acrostichal, 2 + 3 dorsocentral, 1 + 2 intra-alar, 2 posthumeral, 1 presutural, 2 notopleural and 2 postsutural supra-alar setae; postalar callus with 2 setae. Anatergite bare. Katepisternum with 2 setae. One short anepimeral seta, about 0.5–0.7 times as long as katepisternal setae. Scutellum with 3 pairs of marginal setae (basal, lateral and apical); lateral pair about 0.65–0.75 times as long as basal; apical pair crossed and horizontal.

**Legs.** Fore tibia with 2 posterior setae; preapical anterodorsal seta of fore tibia as long and robust as preapical dorsal seta; fore claws about 0.33 times as long as tarsomere 5. Mid tibia with 1 anterodorsal seta, 2 posterior setae, 1 ventral seta very weak and shorter than maximum diameter of mid tibia. Posterior margin of hind coxa bare; hind tibia with 2–4 anterodorsal setae, irregular in length and thickness.

**Wing** (Fig. 19). Base of  $R_{4+5}$  bare. Bend of M rounded. Crossvein dm-cu not oblique. Petiole of  $r_{4+5}$  about as long as post-angular portion of M.

**Abdomen.** Tergites not fused. Syntergite 1+2 with 1 pair of short and weak median marginal setae. Tergite 3 with 1 pair of median marginal setae. Tergite 4 with a row of 10 marginal setae. Tergite 5 with a row of 8 marginal setae.



**FIGURES 17–22.** *Rossimylops* spp. **17–19.** *Rossimylops djerbaensis* **sp. nov.** (holotype female). **17.** Head in anterolateral view, scale bar: 0.3 mm; a- width of parafacial at its narrowest point. **18.** Scutellum, subscutellum and ventral calypter in right posterolateral view (a, l and b show base of apical, lateral and basal scutellar setae, respectively), scale bar: 0.3 mm. **19.** Left wing in ventral view. **20–22.** *Rossimylops exquisitus* (Richter). **20.** Head in anterolateral view (holotype female of *Persedea exquisita* Richter), scale bar: 0.5 mm; a- width of parafacial at its narrowest point. **21.** Scutum, scutellum, ventral calypter and abdominal tergites 1+2 in dorsal view (same specimen as before), scale bar: 0.5 mm. **22.** Scutellum and abdominal syntergite 1+2 in right dorsolateral view (paratype female of *Mesnilomyia rufipes* Zeegers), scale bar: 0.5 mm.

**Hosts.** Unknown.

**Distribution.** Tunisia (Fig. 1).

***Rossimylops exquisitus* (Richter) comb. nov.**

(Figs. 20–22)

*Persedeo exquisita* Richter, 2001: 28. Type locality: Tehran (Iran).

*Mesnilomyia rufipes* Zeegers 2007: 411. Type locality: 12km NW of Manakhah (Yemen). **Syn. nov.**

**Type material examined.** **Holotype** ♀ of *Persedeo exquisita* Richter: Turkey [in error for Iran] / Teheran / iv.1979 / ex Embioptera / culture // Holotypus *Persedeo / exquisita* / Richter [BMNH]. **Paratypes** of *Mesnilomyia rufipes* Zeegers: 3 ♀♀, YEMEN, 12km NW of Manakhah, 05.V-17.VI.2002, A. v. Harten, mal.trap [SMNS, TZC].

**Diagnosis.** Female. Body length: 2.5–4.5 mm. Palpus, thorax (including scutellum) and femora yellow. Ventral facial margin not protruding and hardly visible in profile. Vertex 0.60–0.84 times as wide as compound eye in dorsal view. Parafrons at its narrowest point at most 0.5 times as wide as postpedicel (measured at mid length) (about 2 times as wide as maximum diameter of arista) (Fig. 20). Scutellum with 3 pairs of marginal setae (Figs. 21, 22). Ventral seta of mid tibia longer than maximum diameter of mid tibia. Wing membrane hyaline; cell  $r_{4+5}$  long-petiolate (Fig. 20); base of  $R_{4+5}$  bare. Abdomen at least anteroventrally yellow (syntergite 1+2 and 3); tergites 4 and 5 usually black dorsally, rarely also ventrally. Male Unknown.

**Description.** Female: see original descriptions: Richter (2001); Zeegers (2007).

**Hosts.** Unidentified Embioptera (Richter 2001).

**Distribution.** Iran, Yemen (Fig. 1).

**Remarks.** Based on the original description and examination of the three paratypes of *Mesnilomyia rufipes* available to us, we have observed individual variation in body length, morphometric ratios of the head and in the colouring of the abdomen; the holotype of *P. exquisita* falls well within this range. We conclude that no sound morphological evidence exists to separate the two nominal species and thus, *M. rufipes* is considered a junior synonym of *P. exquisita*.

***Rossimylops longicornis* (Kugler) comb. nov.**

(Figs. 23–27)

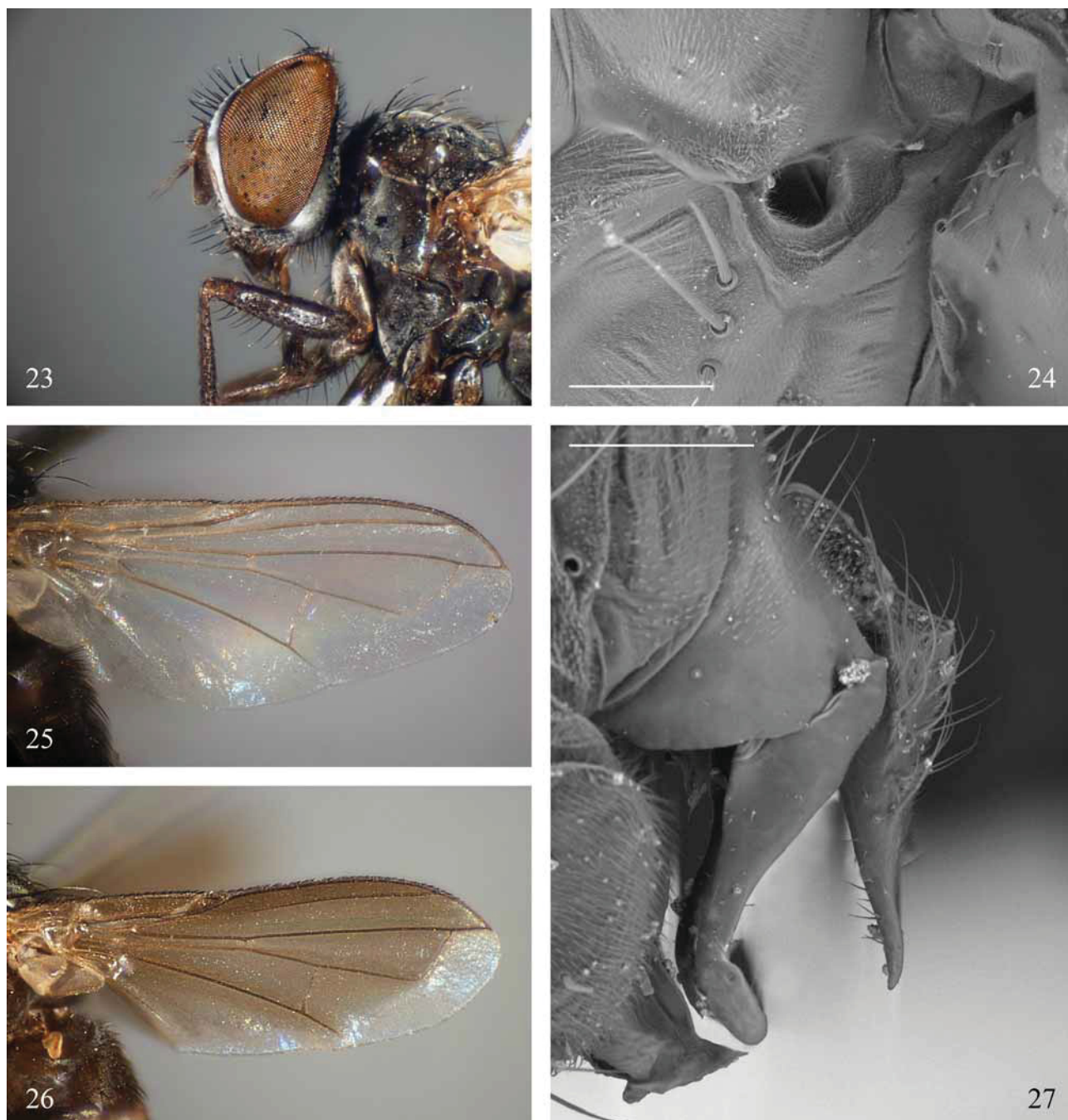
*Mesnilomyia longicornis* Kugler, 1972: 108. Type locality: Zefat (Israel).

**Type material examined.** **Holotype** ♂: Zefat / Israel / 11.x.1969 / leg. Kugler // *Mesnilomyia* ♂ / *longicornis* Kugler // 312 // HOLOTYPE [TAU]. **Paratypes:** ISRAEL – 1 ♂, Hanita, 30.x.1971, J. Kugler; Zefat: 1 ♀, 11.x.1969, 2 ♂♂, 1 ♀, 14.ix.1971, J. Kugler; Yoqne'am: 2 ♂♂, 5.x.1969, 1 ♀, 15.x.1969, J. Kugler [all TAU].

**Other material examined.** BULGARIA – 1 ♂ 1 ♀, Irakli, steppe nr. seashore, 42.47N 27.54E, 16.vii.1987, Barták [SMNS]; 2 ♀♀, Sv. Vlas. near Nesebar, 20m, 1-31.viii.1998, Malaise trap., C. v. Achterberg, R. de Vries, P. V. Atanassova [SMNS]. GREECE – 1 ♀, Zakynthos Is., Skopos-Berg [= Mount Skopos] 5km SE, Zakynthos, Macchie [= maquis] 200m, 16.v.1996, G. Miksch [SMNS]. ISRAEL – 1 ♀, 'Afula, 19.iv.1976, A. Freidberg [TAU]; 1 ♂ SH1 259 [whitout locality] [TAU]; 2 ♂♂, Nahal 'Ammud, 1.ix.1973, A. Freidberg [TAU].

**Diagnosis.** Body length: 3–5 mm. Face flat, ventral facial margin not visible in lateral view (Fig. 23). Prementum about 2–3 times as long as its diameter. Palpus at most 0.66 times as long as postpedicel. Scutellum with 2 pairs of marginal setae. Presutural area of scutum with three wide longitudinal dark vittae (lateral pair,

about as wide as medial vitta, reaching the transverse suture posteriorly). Mid tibia with 1 anterodorsal seta. Section of M between r-m and dm-cu usually shorter than section between dm-cu and bend of M (Figs. 25, 26). Petiole of  $r_{4+5}$  more than half as long (up to as long) as post-angular portion of M (Figs. 25, 26). Male: postpedicel 2.46–2.90 times as long as pedicel; wing membrane hyaline (Fig. 25); ventral and dorsal calypteres white; surstylus long and narrow, distal 0.25–0.33 clearly bent posteriorly (Fig. 27); cerci, in lateral view, more or less straight and not hook-like distally (Fig. 27). Female: postpedicel 2.7–3.1 times as long as pedicel; wing pattern as in Fig. 26; posterior extensions of labella well developed; ventral calypter varied from brownish with a slightly darker rim to evenly dark brown.



**FIGURES 23–27.** *Rossimylops longicornis* (Kugler). **23.** Head and thorax in left lateral view (paratype male: Israel, Yoqne'am). **24.** Left posterior thoracic spiracle (male: Israel, Nahal 'Ammud), scale bar: 0.1 mm. **25.** Left wing in ventral view (holotype male). **26.** Left wing in ventral view (paratype female: Israel, Zafat). **27.** Cerci and surstylus in left lateral view (male: Israel, Nahal 'Ammud), scale bar: 0.1 mm.

**Description.** See original description (Kugler 1972).

**Hosts.** Unknown.

**Distribution.** Greece (Zakynthos, Crete, North Aegean Islands), E Bulgaria, Israel, Transcaucasia (Georgia, Armenia, Azerbaijan) (Richter 1995)(Fig. 1).

**Remarks.** Females from Europe differ from female paratypes from Israel in having a wider parafacial (about as wide as postpedicel); while no specimens from Transcaucasia were examined. Because this is the only sound morphological character separating these two forms, and because no male specimens from Europe were available, we have chosen not to describe the European form as a new species.

***Rossimylops magnificus* (Kugler) comb. nov.**

(Figs. 28–31)

*Mesnilomyia magnifica* Kugler, 1972: 105. Type locality: 'Arad (Israel).

**Type material examined.** **Holotype** ♂: 'Arad / Israel / 19.VII.1971 / leg. Kugler // *Mesnilomyia* ♂ / *magnifica* Kugler / HOLOTYPE [TAU]. **Allotype:** same data as holotype [TAU]. **Paratypes:** ISRAEL – 'Arad: 6 ♂♂ 3 ♀♀, 30.vi.1970, 1 ♂, 6.vii.1970, J. Kugler; 1 ♀, Ramon, 4.viii.1970, J. Kugler; 1 ♂ 1 ♀, Elat, 25.iii.1970, J. Kugler [all TAU]. IRAQ – 1 ♀, R. Tigris Dawrh., v-vi.1920, A. D. ?Brair [TAU].



**FIGURES 28–31.** *Rossimylops magnificus* (Kugler). **28.** Head and thorax in left lateral view (paratype female: Israel, 'Arad). **29.** Head in anterior view (same specimen as before). **30.** Right wing in ventral view (holotype male). **31.** Abdomen in dorsal view (male: Israel, Ha'Meishar).

**Other material examined.** ISRAEL – 1 ♂, Avenat, Rt. 90, 31°41'N 35°26'E, 23.v.2005, L. Friedman; 1 ♀, 'En Gedi, 25.iii.1964, J. Margalit; 1 ♀, Nahal Ze'elim, 24.iv.1975, J. Kugler; 1 ♀, Shezaf N.R. 30°44.92'N 35°16.07'E, 5.xi.1999, I. Yarom, N. Zeevi, Malaise trap; 2 ♂♂, Ha'Meshar, 9.iii.1977, A. Freidberg; 1 ♀, 'En Yahav, 11.iv.1992, A. Freidberg; 1 ♂, 'Ammude 'Amram, 26.iv.1974, A. Freidberg; 1 ♂, Nahal Shelomo, 13.iv.1992, A. Freidberg [all TAU]. EGYPT [Sinai] – 1 ♀, Wadi Nazez, 8.iv.1973, A. Freidberg; 1 ♂, Wadi Sa'al, 24.ix.1977, D. Simon; 1 ♂, Tarfat-el-Kadarin, 9.iv.1973, A. Freidberg; 2 ♂♂, Nueiba', 20km S, 12.iv.1992, A. Freidberg [all TAU].

**Diagnosis.** Body length: 4.5–6.0 mm. Ventral facial margin visible in lateral view, anterior to vibrissal angle (Fig. 28). Prementum about 4–5 times as long as its diameter. Presutural area of scutum (as well as post-sutural area) with three wide longitudinal dark vittae (lateral pair about as wide as medial vitta, reaching the transverse suture posteriorly). Scutellum with 2 pairs of marginal setae. Petiole of  $r_{4+5}$  0.33–0.50 (rarely more) times as long as post-angular portion of M. Base of  $R_{4+5}$  bare. Male: wing membrane entirely hyaline (Fig. 30); postpedicel 1.74–1.88 times as long as pedicel; terminalia as in *R. achilleae*. Female: vertex at least 0.68 times as wide as compound eye in dorsal view; postpedicel 1.68–1.88 times as long as pedicel; parafacial, in lateral view, 0.75–1.00 times as wide as postpedicel (Fig. 28); fronto-orbital plate entirely and evenly covered with microtrichia (Fig. 29); halter from yellow to dark brown; wing membrane not hyaline, mainly brownish with a milky posterior edge (as in Fig. 7); coxae varied from light brown, to red to yellowish; abdomen shiny black or with basal bands of reflecting microtrichia on tergites 4 and 5 (Fig. 31).

**Description.** See original description (Kugler 1972).

**Hosts.** Unknown

**Distribution.** Israel, Egypt (Sinai), Iraq (Fig. 1).

***Rossimylops subapertus* (Herting) comb. nov.**  
(Figs. 32–41)

*Mesnilomyia subaperta* Herting 1983: 5. Type locality: Anbar-Abad (Iran).

**Type material examined. Holotype** ♂: S.O. IRAN / [Djiroft] / Anbar-Abad / 21. – 30.IV.1956 / W. Richter leg. // *Mesnilomyia / subaperta* / B. Herting det. n. sp. Type [SMNS].

**Other material examined.** ISRAEL – Herzliyya, 31°9'N 34°51'E: 5 ♂♂, 1 ♀, 3.vi.2002, 2 ♂♂, 11.vi.2002, 3 ♂♂, 8.iv.2005, A. Freidberg [TAU, 2 ♂♂ in PCV]; Tel Aviv: 1 ♀, 22.iv.1998 A. Freidberg, 1 ♂ 1 ♀, 25.viii.2002, T. Stern [TAU].

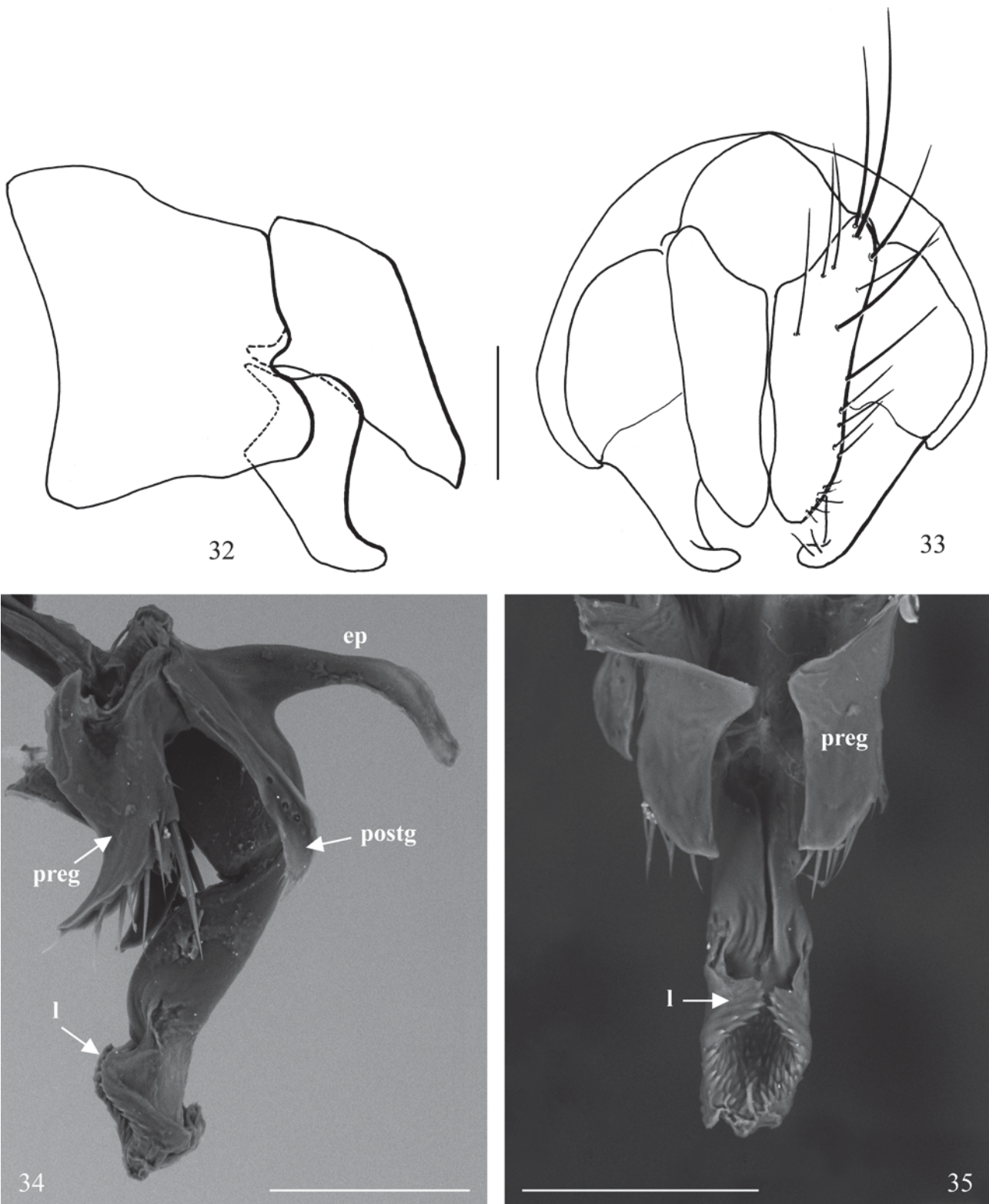
**Diagnosis.** Ventral facial margin not visible in lateral view (Fig. 36). Prementum 2.0–2.3 times as long as its diameter at mid length. Presutural area of scutum with three longitudinal dark vittae, the lateral pair very small, not reaching the transverse suture posteriorly (Fig. 38); postsutural area of scutum shiny black or nearly so. Scutellum with 3 pairs of marginal setae (Fig. 39). Vein  $R_{4+5}$  with one basal setula. Cell  $r_{4+5}$  closed at wing margin, not petiolate (Fig. 40). Male: postpedicel about 1.7–1.9 times as long as pedicel. Female: vertex shiny black; lateral vertical seta not differentiated from postocular row; fronto-orbital plate shiny black for at most half of its length (mainly around proclinate orbital setae); postpedicel about 1.8 times as long as pedicel.

**Description.** Male. External morphology, see original description: Herting (1983: 5).

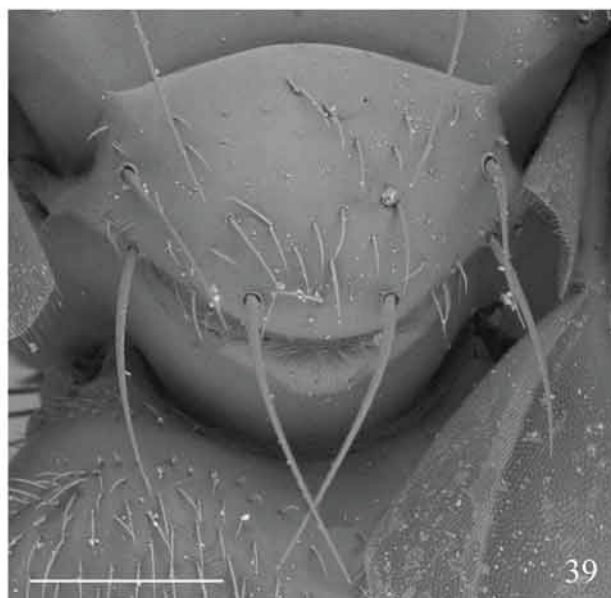
Male terminalia (Figs. 32–35) [described for the first time]. Tergite 6 narrow, fused to segment 7+8 and bare. Epandrium short and convex. Hypandrial arms not joined, sub-parallel. Pregonite (Figs. 34, 35) pointed distally and strongly bent anteriorly, posterior margin with a row of stout setae. Postgonite (Fig. 34) straight, long and narrow; slightly pointed in front distally, slanted postero-apically; distally covered with hair-like setulae. Basiphallus without basal keel. Epiphallus (Fig. 34) in para-basal position, well developed; distal two thirds weakly sclerotized. Dorso-lateral lobes of distiphallus well developed and 'shifted' anteriorly (Figs. 34,

35). *Acrophallus* not tubular. Cerci (Figs. 32, 33) stout, not fused, apically rounded in posterior view, more or less pointed in lateral view; long setae present at or near base of cerci, the longest of these reaching about 0.75 times length of entire cerci. Surstylus slightly shorter than cerci, distal third bent postero-medially (Fig. 32).

Female [described for the first time]. Body length: 4.0–4.3 mm.



**FIGURES 32–35.** *Rossimylops subapertus* (Herting) (male: Israel, Tel Aviv) scale bar: 0.1 mm. **32–33.** Epandrial complex. **32.** Left lateral view. **33.** Posterior view. **34.** Pregonite, postgonite and phallus in left lateral view. **35.** Pregonites and phallus in ventral view. Abbreviations: ep, epiphallus; l, dorso-lateral lobe of distiphallus; postg, postgonite; preg, pregonite.



**FIGURES 36–41.** *Rossimylops subapertus* (Herting). **36.** Head and thorax in left lateral view (female: Israel, Tel Aviv). **37.** Head in anterodorsal view (same specimen as before). **38.** Head and scutum in dorsal view (male: Israel, Herzliyya). **39.** Scutellum in posterodorsal view (female: Israel, Tel Aviv), scale bar: 0.3 mm. **40.** Left wing in ventral view (same specimen as before). **41.** Abdomen in dorsal view (same specimen as before).

Colour. Head black, mainly covered with light-grey reflecting microtrichia; vertex shiny black; fronto-orbital plate shiny black for at most half of its length (mainly around proclinate orbital setae). Frontal vitta reddish-brown. Scape and pedicel yellowish-red; postpedicel mainly yellowish-brown. Palpus yellow, at most basally brown. Thorax entirely black; presutural area of scutum with three longitudinal dark vittae (the lateral pair very small, not reaching the transverse suture posteriorly) (Fig. 38); postsutural area of scutum shiny black. Ventral and dorsal calypteres white. Wing pattern as in Fig. 40. Tegula and basicosta brown. Halter yellow. Legs mainly black; fore and hind coxae brown. Abdomen shiny black almost without microtrichia (Fig. 41).

Head (Figs. 36, 37). Arista thickened on basal third. First aristomere as long as wide; second aristomere about 1.5 times as long as wide. Postpedicel about 1.8 times as long as pedicel. Vertex at its narrowest point 0.67 times as wide as compound eye in dorsal view. Ocellar seta well developed, proclinate. Ocelli in form of isosceles triangle (distance between posterior ocelli is smaller than distance between posterior and anterior ocelli). Medial vertical seta strong, reclinate, sub-parallel. One dorsal orbital seta; 3 proclinate orbital setae. Six frontal setae descending anteroventrally to level of base of scape or slightly more ventrally. Parafacial at its narrowest point about 0.4-0.6 times as wide as postpedicel. Face and ventral facial margin not visible in lateral view. Vibrissa well developed, arising above level of ventral facial margin. Facial ridge with only one decumbent setula above vibrissa. Gena in profile 0.14-0.17 times as high as compound eye. Postocular setae short. Occiput flat or slightly convex, without white hair-like setulae. Prementum about 2.3 times as long as wide. Palpus about 0.8 times as long as postpedicel.

Thorax (Fig. 38, 39). Postpronotum with 2 setae. Scutum with 1-2 + 0-3 (very indistinct) acrostichal, 2-3 + 3 dorsocentral, 1 + 2-3 intra-alar, 2 posthumeral, 1 presutural, 2 notopleural and 0-1 postsutural supra-alar setae; postalar callus with 2 setae. Anatergite bare or with small patch of short, black, erect setulae (asymmetric). Katepisternum with 2 setae. One short anepimeral seta, about 0.5-0.7 times as long as katepisternal setae. Scutellum with 3 pairs of marginal setae (basal, lateral and apical) of about equal length; apical pair crossed and horizontal.

Legs. Fore tibia with 2 posterior setae; preapical anterodorsal seta of fore tibia as long and robust as preapical dorsal seta; fore claws shorter than tarsomere 5. Mid tibia with 1 anterodorsal seta, 2 posterior setae, 1 ventral seta. Posterior margin of hind coxa bare; hind tibia with an irregular row of 8-9 anterodorsal setae.

Wing (Fig. 40). Base of  $R_{4+5}$  with 1 short setula dorsally. Bend of M rounded, obtuse. Crossvein dm-cu not oblique (nearly at a right angle). Wing cell  $r_{4+5}$  just closed at wing margin.

Abdomen (Fig. 41). Tergites not fused. Syntergite 1+2 with 1 pair of short and weak median marginal setae. Tergite 3 with 1 pair of median marginal setae. Tergite 4 with a row of 8 erect marginal setae. Tergite 5 with a row of 4 marginal setae. "Marginal" setae of abdomen displaced anteriorly in discal or sub-discal position.

**Hosts.** Unknown.

**Distribution.** Iran, Israel (new record), Turkmenistan (Ziegler 1991) (Fig. 1).

### ***Rossimylops whiteheadi* Mesnil** (Figs. 42-47)

*Rossimylops whiteheadi* Mesnil, 1953: 145. Type locality: Grahamstown (South Africa).

**Material examined.** SOUTH AFRICA – 1 ♂, Cape, 2km S of Grahamstown, 33°20'S:26°31'E 800m, 20.xi.1990, Londt & Whittington, Dassie Krantz Forest, NMSA-DIP / 12617 [NMSA]. 1 ♀, Ex larva of *Dictyoploca* sp. n. [= *Apterembia* Ross] (Embioptera), Grahamstown, Em. 1.viii.1951, E. McC. Callan, c.i.e. coll. / no. 15689, Pres by, Com Inst Ent, B. M. 1957 – 6, *Rossimylops whiteheadi* Mesn., E. McC. Callan det. [BMNH].

**Diagnosis.** Lateral vertical seta well developed and strongly differentiated from the postocular row. Face slightly visible in lateral view. Ventral facial margin well visible in lateral view, anterior to vibrissal angle (Fig. 42). Prementum 6–9 times as long as wide. Presutural area of scutum with three longitudinal dark vittae, the lateral pair broad. Scutellum with 3 pairs of marginal setae. Cell  $r_{4+5}$  closed at wing margin or very short-petiolate. Vein  $R_{4+5}$  entirely bare. Abdominal tergites 3–5 with a narrow basal band of reflecting microtrichia (Fig. 43). Male terminalia as in Figs. 44–47. Female: vertex shiny black; lateral vertical seta well differentiated from postocular row.

**Description.** Male. External morphology, see original description: Mesnil (1953: 145–146).

Male terminalia [described for the first time] (Figs. 44–47). Tergite 6 narrow, fused to segment 7+8 and bare. Epandrium short and convex. Hypandrial arms not joined, sub-parallel. Pregonite (Fig. 46) pointed distally and strongly bent anteriorly, posterior margin with 2 or 3 stout, long setae. Postgonite (Fig. 46) slightly bent anteriorly, apically rounded, bare. Basiphallus without basal keel. Epiphallus (Fig. 47) in para-basal position, well developed; weakly sclerotized. Dorso-lateral lobes of distiphallus well developed and “shifted” anteriorly (Fig. 47). Acrophallus not tubular. Cerci (Figs. 44, 45) unfused and divided apically, sub-triangular in posterior view, apically pointed; short setae present at or near base of cerci, the longest of these reaching about half length of entire cerci. Surstylus slightly longer than cerci, basal two-thirds sub-rectangular, distal third bent postero-medially and slightly twisted (Fig. 45).

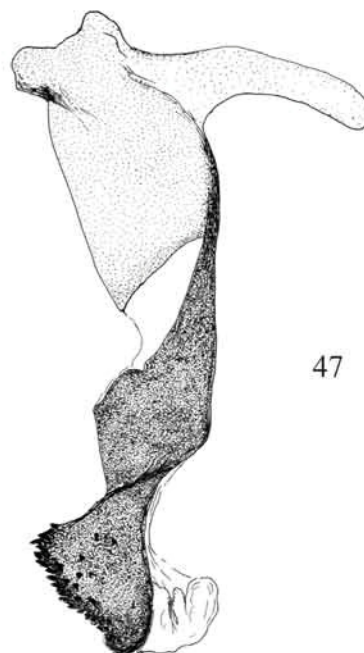
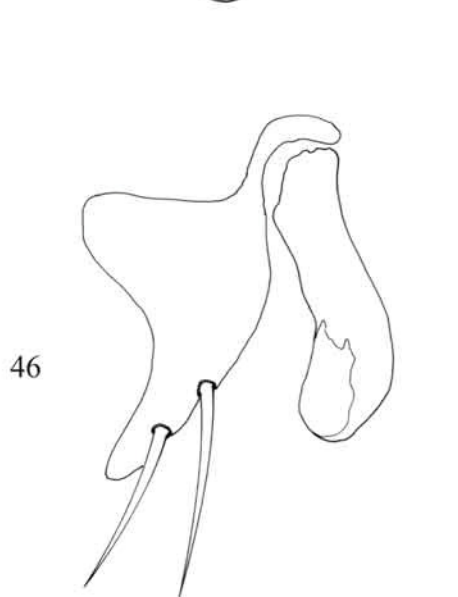
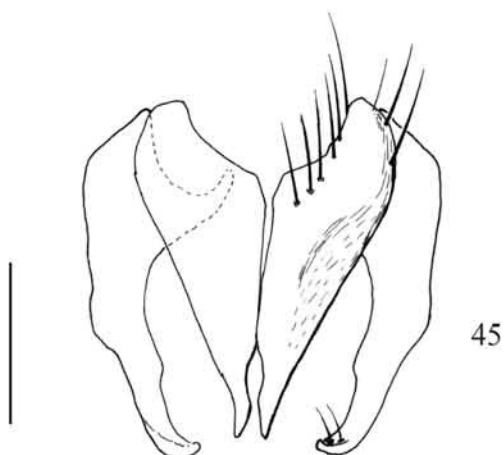
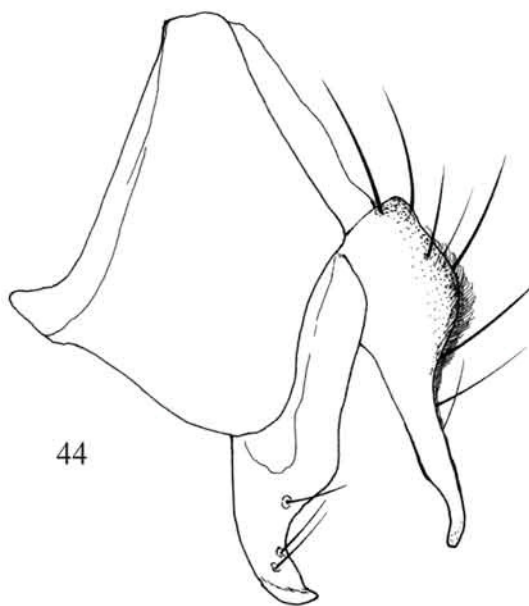
Female [described for the first time]. Body length: 5.13 mm.

Colour. Head black, mainly covered with light-grey reflecting microtrichia; vertex shiny black; fronto-orbital plate mainly shiny black, with narrow stripe of reflecting microtrichia from parafacial near the medial margin of compound eye. Frontal vitta brown. Scape and pedicel reddish-brown; postpedicel mainly blackish-brown, yellow at base. Palpus yellow, at most basally brown. Thorax entirely black; pre- and postsutural areas of scutum with three longitudinal dark vittae. Ventral and dorsal calypteres white. Wing membrane mainly hyaline, only slightly brownish anteriorly. Tegula reddish, basicosta yellow. Halter yellow. Legs black. Abdomen entirely black in ground colour; tergites 3–5 with narrow basal bands of reflecting microtrichia (Fig. 43).

Head (Fig. 42). Arista thickened on basal third or less. First and second aristomeres not longer than wide. Postpedicel about 1.7 times as long as pedicel. Vertex at its narrowest point 1.14 times as wide as compound eye in dorsal view. Ocellar seta well developed, proclinate. Ocelli in form of isosceles triangle (distance between posterior ocelli is smaller than distance between posterior and anterior ocelli). Medial vertical setae strong, reclinate, sub-parallel. Lateral vertical seta strong, about twice as long as postocular setae. One dorsal orbital seta; 2 proclinate orbital setae (with one short proclinate setula between them). Six frontal setae descending to level of base of scape or slightly more ventrally. Parafacial at its narrowest point about 1.25 times as wide as postpedicel. Face at most slightly visible in lateral view. Ventral facial margin well visible in lateral view, anterior to vibrissal angle. Vibrissa not much differentiated from subvibrissal setae, arising at level of ventral facial margin. Facial ridge with few decumbent setulae above vibrissa. Gena in profile about 0.3 times as high as compound eye. Postocular setae short. Occiput flat, without white hair-like setulae. Prementum about 9 times as long as wide. Posterior extensions of labella well developed. Palpus sub-cylindrical, about 0.5–0.6 times as long as prementum.

Thorax. Postpronotum with 2 setae. Scutum with 2 + 1 acrostichal, 2 + 3 dorsocentral, 0 + 2 intra-alar, 1 posthumeral, 1 presutural, 2 notopleural and 2 postsutural supra-alar setae; postalar callus with 1 seta. Anatergite with a small patch of short, black, erect setulae. Katepisternum with 2 setae. One short anepimeral seta, no more than 0.3 times as long as katepisternal setae. Scutellum with 3 pairs of marginal setae (basal, lateral and apical) of about equal length; apical pair crossed and horizontal.

Legs. Fore tibia with 1 posterior seta; preapical anterodorsal seta of fore tibia as long and robust as preapical dorsal seta; fore claws shorter than tarsomere 5. Mid tibia with 2 anterodorsal setae, 2 posterior setae, 1 ventral seta. Hind tibia with 3–4 anterodorsal setae.



**FIGURES 42–47.** *Rossimylops whiteheadi* Mesnil (South Africa, Grahamstown). **42.** Head and thorax in left lateral view (female). **43.** Abdomen in dorsal view (female). **44–47.** Male terminalia, scale bar: 0.1 mm. **44.** Epandrial complex in left lateral view. **45.** Cerci and surstyli in posterior view. **46.** Pregonite and postgonite in left lateral view. **47.** Phallus in left lateral view.

Cell. Vein  $R_{4+5}$  entirely bare. Bend of M rounded, obtuse. Crossvein dm-cu not oblique (nearly at a right angle). Wing cell  $r_{4+5}$  very short petiolate.

Abdomen (Fig. 43). Tergites not fused. Syntergite 1+2 with 1 pair of well developed median marginal setae. Tergite 3 with 1 pair of median marginal setae. Tergite 4 with row of 9 erect marginal setae. Tergite 5 with row of 6 marginal setae. "Marginal" setae of abdomen displaced anteriorly in discal or sub-discal position.

**Hosts.** *Apterembia* sp. (Embioptera: Embiidae) (Mesnil 1953, as *Dictyoploca*).

**Distribution.** South Africa (Eastern Cape).

**Remarks.** The male holotype is preserved in the NMSA; its terminalia were dissected by an unknown person and, at present, are apparently lost (Mostovski, pers. comm. 2008). Since the original description of *R. whiteheadi* is detailed and the drawing of the head of the holotype is well done, there is no doubt that the male specimen examined by us is conspecific. Thus, we have relied on the male specimen available to us for the description of this species rather than examine the holotype, which in any case is missing its terminalia. Examination of the male terminalia of *R. whiteheadi* was fundamental to determining the correct systematic position of *Rossimylops*.

### *Incertae sedis "Mesnilomyia" calyptrata* Zeegers

(Figs. 48–50)

*Mesnilomyia calyptrata* Zeegers, 2007: 410. Type locality: 12km NW of Manakhah (Yemen).

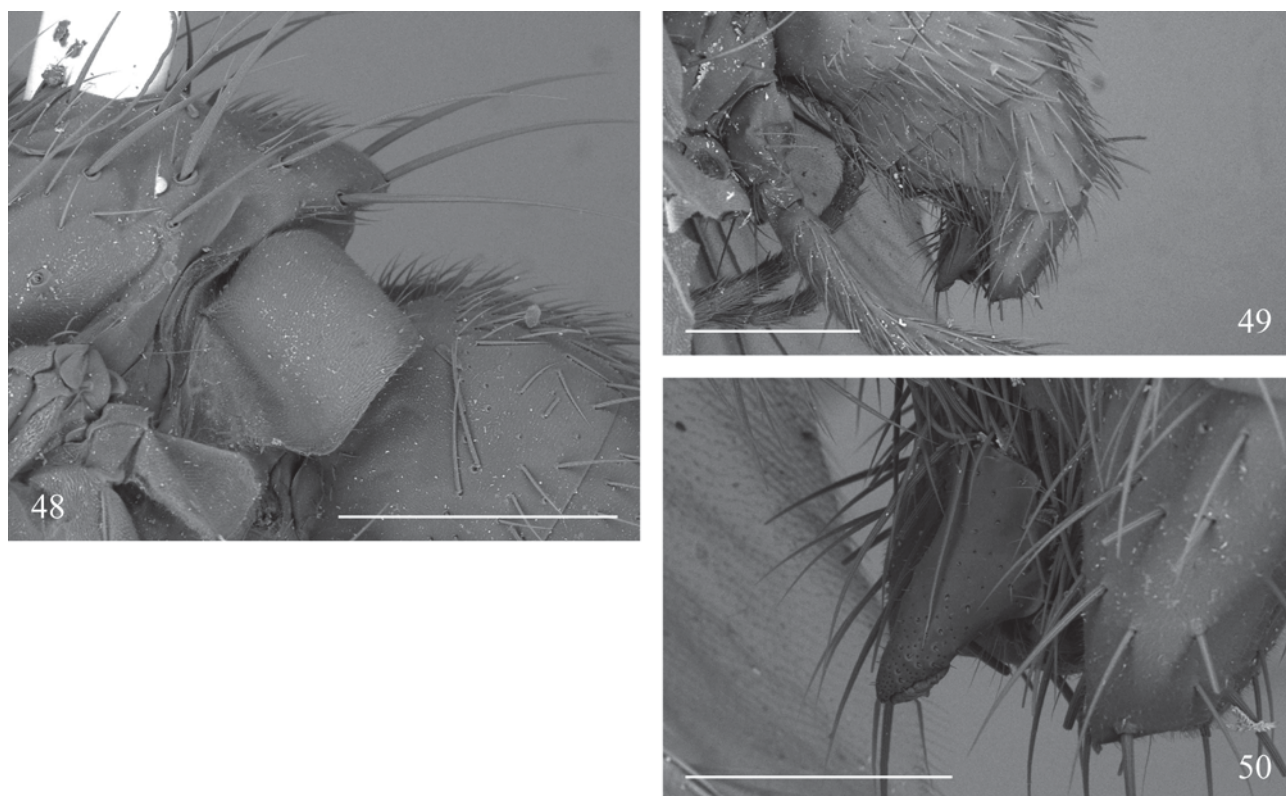
**Type material examined.** Holotype ♀: YEMEN / 12 km NW of Manakhah / 27.III-05.V.2002 / A. v. Harten, mal. trap [ZMAN].

**Remarks.** The present "definition" of *Rossimylops* excludes *Mesnilomyia calyptrata* Zeegers 2007, which has the following non-characteristic features: i) presutural area of scutum with two wide black vittae, ii) lateral scutellar seta displaced at about mid length between basal and apical setae (Fig. 48); iii) costal spine well differentiated from costal setulae; iv) marginal setae on tergites 3–5 not displaced anteriorly; v) ovipositor characterized by a wedge-shaped sternite (7<sup>th</sup> or 8<sup>th</sup>) (Figs. 49, 50) (it is not possible to establish with certainty which sternite is involved, as the abdomen was not dissected in order not to damage the holotype further); a similar apomorphic structure is not known in other Minthoini nor in other Tachininae. Furthermore, important characters of the chaetotaxy of the legs are not visible in the holotype (the only known specimen of this species), which lacks both mid legs and the right hind leg; also, the left hind leg lacks the tarsus and the distal portion of the tibia is damaged in such a way that the preapical setae (very important in the taxonomy of Minthoini and related tribes) are not visible.

*Mesnilomyia calyptrata* Zeegers is surely not congeneric with other *Rossimylops* species, and we cannot place it in any described genus.

### Discussion

The combination of i) egg with a very thin chorion, ii) male tergite 6 undivided and posteriorly fused with segment 7+8 and iii) non- or weakly sclerotized latero-ventral portion of distiphallus, provides support for a Tachininae affiliation of *Rossimylops*. Moreover, members of the genus do not have a plate-like pregonite and flexible membrane attaching the basiphallus to the distiphallus, a feature which characterizes the groundplan of the Dexiinae (Tschorsnig 1985; Wood 1987; Tschorsnig & Richter 1998), nor any of the character states listed by Tschorsnig (1985) and Tschorsnig & Richter (1998) and apparent in the male terminalia of the Phasiinae and Exoristinae.



**FIGURES 48–50.** “*Mesnilomyia*” *calyptrata* Zeegers (holotype female). **48.** Part of the thorax and abdomen in left lateral view, scale bar: 0.5 mm. **49.** Abdomen in left lateral view, scale bar: 0.5 mm. **50.** Detail of ovipositor in left latero-ventral view, scale bar: 0.2 mm.

The first instar larva with a non-sclerotized white integument and the structure of male terminalia provide no support for a macquartiine affiliation of *Rossimylops* (cf. Tschorsnig 1985). The structure of cerci and surstylus, in lateral view, in a pincer-like position (Figs. 9, 27, 32), could suggest a graphogastrine affiliation, but no *Rossimylops* species has the ventral sclerotizations of the basal membrane of the distiphallus, which represent an apomorphy of the Graphogastrini (= Elfiini) (see Tschorsnig 1985, Figs. 201 and 201 “x”), thus excluding placement in this tribe. Moreover, the very narrow male frontal vitta, practically indistinguishable in front of the fore ocellus, bare parafacial, postpronotum with 2 or 3 setae in a line, prosternum bare and base of vein  $R_{4+5}$  bare or with 1-2 short and very fine setulae exclude placement of *Rossimylops* in Brachymerini and Pelatachinini. Taking into account all the character states mentioned above and considering that the dorsal portion of the distiphallus consists of two symmetrical, weakly sclerotized lobes, which are “shifted” ventrally (see Tschorsnig 1985) (Figs. 10, 34, 35), the preapical posteroventral seta on hind tibia nearly as long as preapical anteroventral seta, and female of *R. longicornis* and *R. whiteheadi* with posterior extensions of the labella, *Rossimylops* should be included in the Minthoini *sensu* Herting (1984) (see Tschorsnig & Herting 1994) or in the “enlarged” tribe Leskiini *sensu* Tschorsnig (1985: 86) [= Leskiini + Minthoini of Herting 1984].

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## References

- Crosskey, R.W. (1980) 93. Family Tachinidae. In: Crosskey, R.W. (Ed.), *Catalogue of the Diptera of the Afrotropical Region*. British Museum (Natural History), London, pp. 822–882.
- Crosskey, R.W. (1984) Annotated keys to the genera of Tachinidae (Diptera) found in tropical and southern Africa. *Annals of the Natal Museum*, 26, 189–337.
- Herting, B. (1957) Das weibliche Postabdomen der calyptraten Fliegen (Diptera) und sein Merkmalswert für die Systematik der Gruppe. *Zeitschrift für Morphologie und Ökologie der Tiere*, 45, 429–461.
- Herting, B. (1983) Neue oder wenig bekannte Tachiniden (Diptera). *Stuttgarter Beiträge zur Naturkunde (A)*, 364, 1–8.
- Herting, B. (1984) Catalogue of Palearctic Tachinidae (Diptera). *Stuttgarter Beiträge zur Naturkunde (A)*, 369, 1–228.
- Herting, B. & Dely-Draskovits, Á. (1993) Tachinidae. In: Soós, Á & Papp, L. (Eds.), *Catalogue of Palearctic Diptera, vol 13, Anthomyiidae-Tachinidae*. Hungarian Natural History Museum, Budapest, pp. 118–458.
- Kugler, J. (1972) Tachinidae of Israel, V. *Mesnilomyia* and *Palmonia*, two new genera of Tachinidae (Diptera). *Israel Journal of Zoology*, 21, 103–112.
- Kugler, J. (1978) A revision of the tachinid fly genus *Plesina* (Diptera: Tachinidae). *Entomologica Germanica*, 4, 84–96.
- Merz, B. & Haenni, J.P. (2000) 1.1. Morphology and terminology of adult Diptera (other than terminalia). In: Papp, L. & Darvas, B. (Eds.), *Contribution to a Manual of Palearctic Diptera (with special reference to flies of economic importance). Vol. 1. General and Applied Dipterology*. Science Herald, Budapest, pp. 21–51.
- Mesnil, L.P. (1953) A new tachinid parasite of an embiopteran. *Proceedings of the Royal Entomological Society of London (B)*, 22, 145–146.
- Mesnil, L.P. (1972) 64g. Larvaevorinae (Tachininae). *Die Fliegen der Palaearktischen Region*, 10 (Lieferung 293), 1065–1112.
- O'Hara, J.E. & Wood, D.M. (2004) Catalogue of the Tachinidae (Diptera) of America north of Mexico. *Memoirs on Entomology, International*, 18, 410 pp.
- Richter, V.A. (1995) New data on the systematics and biology of Palearctic tachinids (Diptera, Tachinidae). [in Russian] *Entomologicheskoe Obozrenie*, 73 (1994), 739–752.
- Richter, V.A. (2001) A new genus and species of tachinid flies (Diptera: Tachinidae) from Iran. *International Journal of Dipterological Research*, 12, 25–28.
- Stuckenberg, B.R. (1999) Antennal evolution in the Brachycera (Diptera) with a reassessment of terminology relating to the flagellum. *Studia dipterologica*, 6, 33–48.
- Townsend, C.H.T. (1916) Elucidations of New England Muscoidea. *Insecutor Inscitiae Menstruus*, 4, 17–33.
- Tschorsnig, H.-P. (1985) Taxonomie forstlich wichtiger Parasiten: Untersuchungen zur Struktur des männlichen Postabdomens der Raupenfliegen (Diptera, Tachinidae). *Stuttgarter Beiträge zur Naturkunde (A)*, 383, 1–137.
- Tschorsnig, H.-P. & Herting, B. (1994) Die Raupenfliegen (Diptera: Tachinidae) Mitteleuropas: Bestimmungstabellen und Angaben zur Verbreitung und Ökologie der einzelnen Arten. *Stuttgarter Beiträge zur Naturkunde (A)*, 506, 1–170.
- Tschorsnig, H.-P. & Richter, V.A. (1998) 3.54. Family Tachinidae. In: Papp, L. & Darvas, B. (Eds.), *Contribution to a Manual of Palearctic Diptera (with special reference to flies of economic importance). Vol. 3. Higher Brachycera*. Science Herald, Budapest, pp. 691–827.
- Tschorsnig, H.-P., Richter, V.A., Cerretti, P., Zeegers, T., Bergstrom, C., Vanhara, J., Van de Weyer, G., Bystrowski, C., Raper, C., Ziegler, J. & Hubenov, Z. (2004) Fauna Europaea: Tachinidae. In: Pape, T. (Ed.), *Fauna Europaea: Diptera, Brachycera*. Fauna Europaea version 1.2'. Electronic database available from <http://www.faunaeur.org> (accessed July 2008).

- Verbeke, J. (1962) Contribution à l'étude des Tachinidae africains (Diptera). *Résultats scientifiques. Exploration Hydro-biologique des Lacs Kivu, Édouard et Albert (1952–1954)*, 3, 77–187.
- Villeneuve, J. (1920) Diptères paléarctiques nouveaux ou peu connus. *Annales de la Société Entomologiques de Belgique*, 60, 114–120.
- Wood, D.M. (1987) 110. Tachinidae. *In*: McAlpine, J.F., Peterson, B.V., Shewell, G.E., Teskey, H.J., Vockeroth, J.R. & Wood, D.M. (Eds.), *Manual of Nearctic Diptera*, Vol. 2. *Research Branch, Agriculture Canada, Monograph*, 28, pp. 1193–1269.
- Zeegers, T. (2007) A first account of the Tachinidae (Insecta: Diptera) of Yemen. *Fauna of Arabia*, 23, 369–419.
- Ziegler, J. (1991) Zwei neue Raupenfliegenarten (Dipt., Tachinidae) aus Usbekistan und faunistische Notizen zu weiteren Arten aus Mittelasien. *Entomologische Nachrichten und Berichte*, 35, 83–90.